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Internationally mobile students and their post-graduation migratory behaviour

AN ANALYSIS OF DETERMINANTS OF STUDENT MOBILITY AND RETENTION RATES IN THE EU

Reinhard Weisser

JEL Classification: F22, I23

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Internationally mobile students and their post-graduation migratory behaviour: an analysis of determinants of student mobility and retention rates in the EU.

Reinhard A. Weisser (Institute of Labour Economics Leibniz University Hannover, Germany)

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ABSTRACT

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A previous version of this paper was presented and discussed at the OECD Working Party on Migration in June 2015.The paper investigates the preferences and post-graduation mobility behaviour of international students, focusing on how the EU could succeed in attracting and keeping highly educated talent from across the globe. Providing their skills to European labour markets, graduates from outside the EU have a potential to enrich the supply of high-skilled labour. Seen as the 28 EU countries still constitute the most attractive destination area for studying abroad, the paper examines different calculation methods in order to generate stay rates for over 170 countries of origin.

Empirical results indicate that for the EU as a whole, aggregate stay rates from stayers from all non-EU source countries lie within a range of 16.4% and 29.1%. They are also typically very low among students from other OECD countries, and much higher for students from less developed or politically less stable countries. The paper concludes by recommending a catalogue of measures to boost the EU's attractiveness, and to increase stay rates. Proposed policy measures draw on a smooth labour market integration of international graduates, as well as on cultivating strong points of the European countries, such as: political stability and participation possibilities, reliable institutions and governance structure, as well as an innovative and competitive environment.

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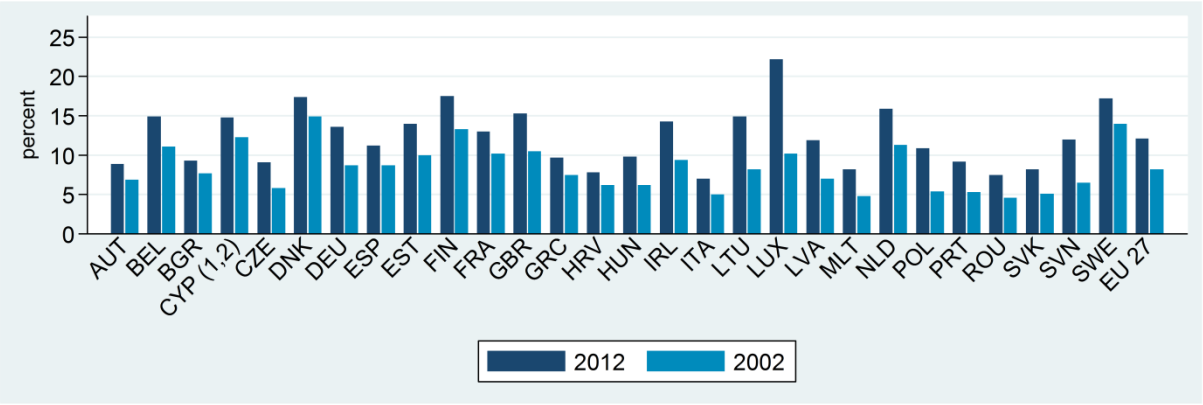
INTERNATIONALLY MOBILE STUDENTS AND THEIR POST-GRADUATION MIGRATORY BEHAVIOUR: AN ANALYSIS OF DETERMINANTS OF STUDENT MOBILITY AND RETENTION RATES IN THE EU

1 INTRODUCTION - ON THE IMPORTANCE OF ATTRACTING AND KEEPING TALENT

1. European economies have always been subject to change over time. Some changes were of a short-term nature and occurred as negative shocks, sending economies into recession. Other changes manifested themselves as medium- or long-term trends. An important evolution, belonging to the second category, is the increasing importance of knowledge-based processes in all developed economies. The input factor 'knowledge', human capital, contributes more and more to productivity in European economies.

2. Although EU member states experienced rather heterogeneous economic development since the early 2000s, there remains one striking similarity: the relative share of tertiary educated individuals employed in science and technology surged between 2002 and 2012. This development is primarily driven by a rising absolute number of highly skilled individuals in these occupations. Consequently, European economies now rely more than ever on the supply of high skilled labour.

Figure 1. Tertiary educated employees in science and technology as percentage of the total active population, 2012 and 2002.



Source: Eurostat, own representation

Note: EU 27 refers to all current members but Croatia.

[1] Footnote by Turkey: The information in this document with reference to «Cyprus» relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognizes the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of United Nations, Turkey shall preserve its position concerning the "Cyprus issue".

Footnote by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognized by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus."

3. This dependence is likely to increase further as the evolution of knowledge-based economies proceeds. To meet this rising demand, and to foster innovativeness, EU economies have to invest in the formation of human capital - the 'brains' of the future labour force.

4. Demographic constraints however, already looming at the horizon, will limit the maximal possible supply of 'brains' the EU will be able to generate, even with increases in the share of youth who are tertiary-educated. To ensure that knowledge-fuelled EU economies will not suffer a fuel shortage in the near future, some short-acting measures might be required.

"I not only use all the brains that I have, but all that I can borrow."

Woodrow T. Wilson, 28th president of the USA, 1856-1924

5. In this spirit, attracting third country workers to the EU is one potential approach. But what if these migration streams are too small, or there still remains a qualification mismatch? To prevent this issue, initiatives have been launched, such as the EU Blue Card, designed specifically to attract high-skilled labour. However, resulting inflows might still be insufficient.

6. Recent trends, i.e. the jump in the number of asylum seekers from 261 thousand in 2010 to 628 thousand in 2014

[2], indicate that actual inflows into the EU could mitigate the demographic constraint, depending on whether the majority of these migrants stay temporarily or permanently. In any case, the distribution of these new immigrants across European member states is not proportional to their labour market size. At the same time, educational background and occupational skill sets of these new arrivals, already acquired abroad, are heterogeneous.

7. Aside from workers who completed education and vocational training abroad there is another group of temporary migrants, namely international students. Their number reached in 2012 an all-time high of almost 1.5 million enrolled students[3], indicating that the EU remains one of the main destinations for studying abroad (see Figure A. 1in the appendix).

8. In 2012, 500 thousand of the 1.46 million of international students in the EU were students from another EU country. Hence, almost two-thirds of all international students in the EU came from countries outside the EU - they constitute potentially a substantial pool of well-educated and highly-skilled future workers. Beyond their formal qualifications they also acquired additional cultural and social capital as well as language skills during their years of study in the EU. All these aspects speak in favour of a smooth integration into an EU labour market. Moreover, by their initial choice of studying in the EU they already demonstrated that the EU has a certain appeal on them.

9. Whereas all major destinations hosted in 2012 distinctly more internationally mobile students than five years ago, the three major destinations attracted slightly smaller shares (Figure 2). Compared to 2007, students gravitated more frequently towards the Russian Federation and China. A noteworthy shift in

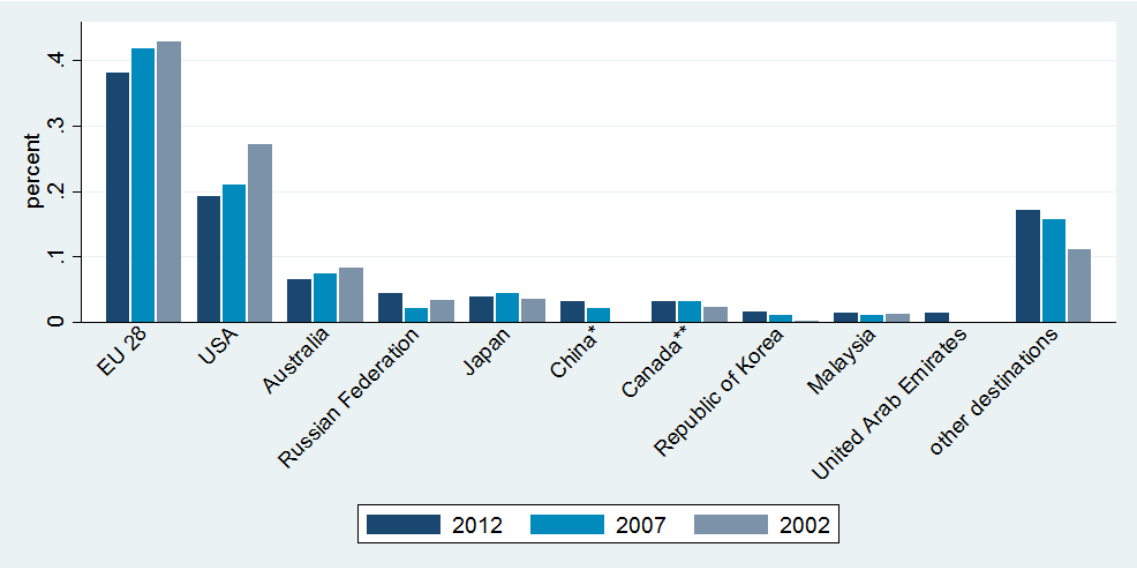
---

[2] Figures are rounded, extracted from Eurostat tables on 'Asylum and Managed Migration'.

[3] Total stock numbers (3.85 million in 2012, 2.83 million in 2007) are below the figures reported in OECD (2013). This is related to the underlying statistical concept – here international students, in case of OECD (2013) foreign students.

relative enrolment figures occurred also in favour of other economies in South East Asia, namely the Republic of Korea, Malaysia or Thailand.

Figure 2. Relative attractiveness expressed as Top-10 destination shares



Source: UNESCO Institute for Statistics, education database; own calculations and representation

Note: * includes Mainland China, Hong Kong and Macau

** most recent values from 2011 instead of 2012

10. In an increasingly interconnected and globalised world, students in tertiary education face a growing number of potentially attractive destinations to study abroad. One of the essential questions in the decades to come is how the EU could manage to remain among the top destinations for international students in a world increasingly competing for highly-skilled labour. Another central question in this context was how to turn effectively the potential of international students into real gains from an EU perspective? Alternatively, referring to the above-noted quotation, one could ask how many brains could be borrowed, under which circumstances and how to proceed to retain these talents for a longer time? These questions constitute the main research questions guiding this report and defining its structure.

11. In order to highlight students' initial preferences, and a possible interconnectedness with subsequent staying behaviour, chapter 2 provides an overview over the distribution of internationally mobile students in the EU. The descriptive analysis sheds light on absolute numbers, as well as relative numbers in relation to total enrolment. Internationally mobile students' preferences are presented based on country (or region) of origin, sex, as well as level and field of study. Aside from a status quo assessment in the year 2012, some changes over time are highlighted as well.

12. Chapter 3 is dedicated to the introduction of a measure for international students' staying behaviour – the so-called 'stay rate'. Main findings from the literature are synthesised, including both academic and administrative reports. A meta-study on internationally mobile academics served as starting point for the exploratory study, presented in the extended version of this paper (Weisser, 2015a). This methodological paper focuses on the derivation of suitable statistics and a detailed empirical assessment of staying patterns of internationally mobile students in the EU and its member countries, eventually indicating 'plausibility bands' for stay rates on the EU level. The main findings, together with a short discussion of related core issue, will be briefly summarised in chapter 4.1 of this report.

13. Yet, the exploratory study's summary is not to be seen as an end in itself, but rather as foundation for an examination of determinants of staying behaviour in two alternative econometric frameworks in the remainder of chapter 4. This empirical evaluation is followed by an analysis of potential labour market and fiscal consequences and a discussion of implications of changing staying behaviour in chapter 5. Based on the previously conducted empirical analyses, chapter 6 deduces some policy recommendations. The concluding chapter 7 provides a summary of all previous chapters' essential findings.

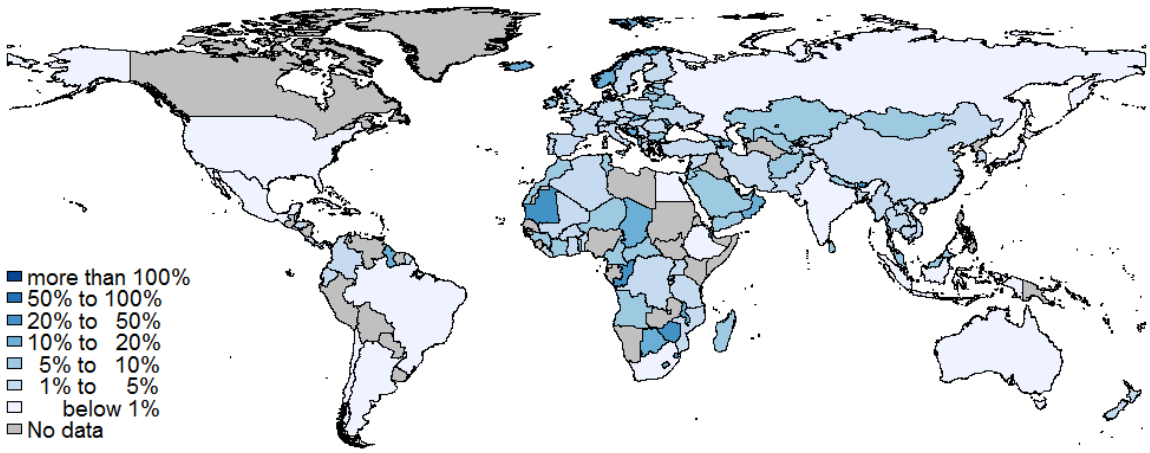
2 DISTRIBUTION OF INTERNATIONALLY MOBILE STUDENTS IN THE EU

14. From an a priori point of view, the attractiveness of the EU Higher Education Area[4] could be one of the most crucial determinants of post-graduation staying behaviour. Only those graduates who chose studying in the European Union in the first place can then in a subsequent decision opt for a prolonged stay and entry into the European labour market. Consequently, it is not only important to understand what makes students staying in a host country after graduation, but also why they came in the beginning, from where they originated and which destinations they have chosen.

15. The decision to study abroad, being part of individual investment in human capital, depends not only on intrinsic motivation but also on the educational landscape in the country of origin.

16. Figure 3 shows how 'outbound mobility ratios' vary across countries. This measure indicates how many students study abroad in relation to all students enrolled in the respective country of origin. In roughly 50 percent of all countries, this ratio is at least five percent. Especially smaller economies, with smaller tertiary educational sectors often display an outbound ratio of more than 10 percent.

Figure 3. Outbound mobility ratio in 2012, by country of origin



Source: UNESCO Institute for Statistics, education database; own calculations and representation

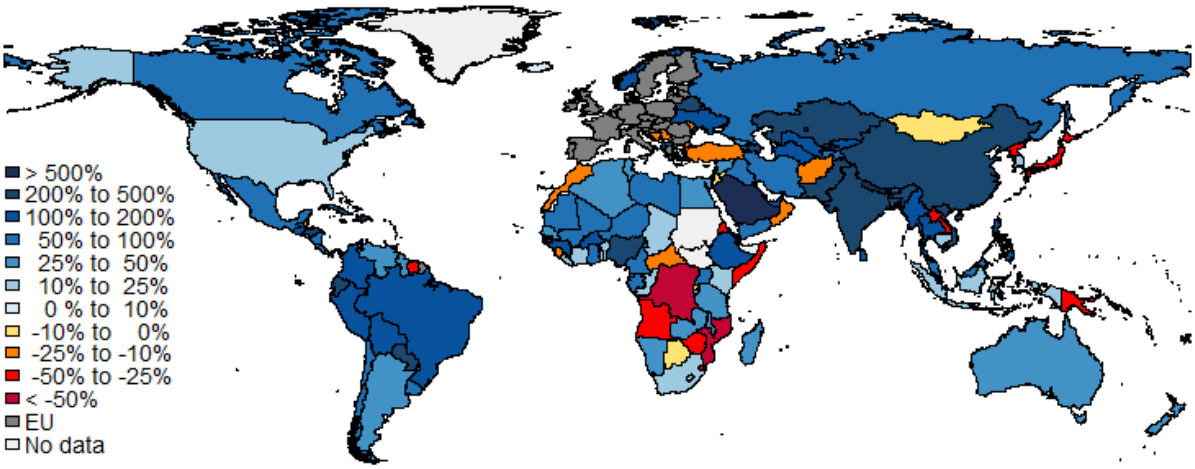
Note: Outbound mobility ratio defined as 'Number of students from a given country studying abroad, expressed as a percentage of total tertiary enrolment in that country'.

[4] In the context of this report, the term 'EU Higher Education Area' shall refer to the EU member states' tertiary education sectors in a geographic dimension. This area is part of the official 'European Higher Education Area', launched in March 2010 (http://www.ehea.info/). The European Higher Education Area also includes non-EU countries.

17. Switching the perspective to the EU as a major destination region, Figure 4 displays the percentage changes regarding the number of internationally mobile students[5] enrolled between 2002 and 2012 by country of origin. Though on average, the EU hosted more internationally mobile students than ever, the emerging picture points to a somehow heterogeneous trend. Whilst the number of internationally mobile students originating from some countries, for example China and India, more than tripled, other countries of origin sent in 2012 distinctly fewer students than one decade ago.

18. What are the reasons for these mixed developments - are they related to changing host or source country conditions? Did changing students' preferences or the structure of the tertiary educational system contribute to such a pattern?

Figure 4. Source countries of internationally mobile students from non-EU countries, percentage change 2002-2012



Source: UNESCO Institute for Statistics, education database; own calculations and representation

19. Referring to credit or degree mobility[6], literature provides some guidance, for instance regarding those general factors affecting students' decision for studying abroad at all, and then, also with respect to their preferred destination country.

---

5 The group of internationally mobile students comprises 'international' and 'foreign' students. International students are those students who crossed a border for studying in a specific destination country whilst their usual domicile is abroad (resident concept). Foreign students are those students who do not hold the citizenship of the respective country they are studying in (national concept). The first concept depicts actual international student mobility in a precise way, but as some countries do only provide information on foreign students, the second category cannot be neglected. Subsequent chapters will differentiate between these two concepts whilst also commenting on the impact regarding outcomes.

6 Credit mobility refers to short- to medium-duration study spells abroad, typically one or two semesters, whilst staying enrolled at a university in the country of origin. Acquired credits from abroad, for instance ECTS in the European context, are then allowed for the domestic degree. In contrast to this, degree mobility refers to those internationally mobile students who enrol for a complete programme abroad, hence obtain their degree abroad. This type of mobility will be at the centre of this work.

2.1 Literature review on determinants of cross-border student mobility

20. Aside from mere intrinsic motives, e.g. acquiring additional human capital, externally set incentives seem able to foster student mobility as well. Within their analysis of any impact of studying abroad on graduates' propensity to start their career abroad, Oosterbeek and Webbink (2009) along with Parey and Waldinger (2011) demonstrated that grants to high-achieving students or the availability of Erasmus funding schemes increase the likelihood of going abroad during studies significantly. Scrutinizing the mobility of ERASMUS-participants, Rodríguez González et al. (2011) focused on host country features which possibly serve as pull-factors for intra-European student flows. Using a gravity model, they showed that flows are positively affected by size of the host country and the share of the highly educated in the country of origin. Quality of receiving institutions and the spoken language in the host country are also relevant flow determinants[7]. Typically for findings in the migration context, distance between source and destination country dampens flows, even in case of intra-European student mobility. Findings of Caruso and de Wit (2013) supported the relevance of a host countries economic performance, regarding integration and overall performance, in the context of intra-European student flows. Beyond that, educational spending and higher levels of safety are positively associated with a host country's attractiveness.

21. Following a human capital approach, Perkins and Neumayer (2013) analysed degree mobility for a large set of source and destination countries, whilst accounting for distinct socio-political and economic features. They also supported findings of Findlay et al. (2012) who stressed acquisition of social and cultural capital to be one of the driving forces behind the decision to study abroad. At the same time both author groups acknowledged that cross-border student mobility should not be seen as an isolated event, but a decision in light of individual career plans. Perkins and Neumayer (2013) presented evidence that enrolment abroad is positively influenced by the income level in the host country - an indication for better labour market perspectives in a host country and thus possibly increasing benefits of studying abroad. Additionally, network effects have been identified, implying that costs of mobility could be mitigated by the presence of fellow nationals which could provide information and support. Sharing a language, which facilitates studying and daily life likewise, seems to affect the decision to study abroad positively as well. Distance, implying higher travel costs, and larger income gaps between sending and receiving countries impose both non-negligible impeding factors in a monetary sense. Both effects are larger in the case of least developed countries, compared to newly industrialised countries[8]. Institutional quality matters primarily for international students from newly industrialised economies whereas higher income levels increase host countries attractiveness to a larger extent for students originating from least developed countries.

22. The relative importance of higher educational sector's features is also emphasised by Van Bouwel and Veugelers (2010) in an analysis of 18 European countries: a larger student base, better ranking positions of universities[9], tuition fees[10] and especially higher funding per student boost the numbers of incoming students. Using data on 13 OECD countries, Beine et al. (2014) confirmed the afore-mentioned major results concerning quality and tuition fee, whilst highlighting the signalling effect of tuition fees. They also identified a positive network effect, pointing to the relevance of past migration streams. Once again, geographical and linguistic proximity have been shown to influence flows positively.

---

7 i.e. if the spoken official language in the destination country is English, French, German, Italian or Spanish , inward flows are higher

8 Both groupings follow the World Bank's classification in 2010.

9 This may also reflect ranking according to the number of foreign students enrolled.

10 Although perhaps counterintuitive at first glance, tuition fees could be perceived as a sign of quality of a host country's universities, thus attracting more students.

23. Thissen and Ederveen (2006) focused more on labour market aspects in their evaluation of possible determinants of enrolment of foreign students in EEA-countries: they concluded that higher income levels and lower unemployment rates substantially foster inflows of foreign students.

24. This short literature review provides some important information on main determinants of cross-border student flows: institutional quality, distance, and economic conditions matter. If a host country's tertiary educational system is perceived to be of high quality, more international students chose this country as a destination. Geographically closer host countries or those with higher degrees of proximity in a cultural or linguistic sense are favoured too. In addition, internationally mobile students seem to be influenced by economic perspectives in a potential host country, accordingly to their individual career plans. Studying abroad is not merely an 'adventure', but a deliberate choice right from the start.

25. To provide an empirical examination of international students' location choices, the following chapter will present the distribution of international and foreign students within the EU Higher Education Area. A special focus rests on source countries, as well on degree types and fields of study.

2.2 Source and destination countries

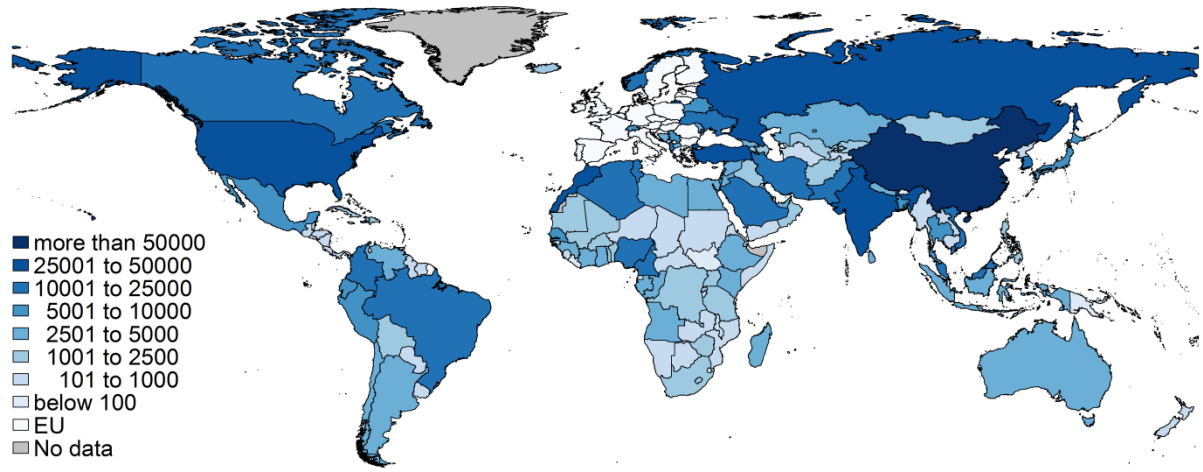
26. Chapter 2.2 is dedicated to a detailed examination of the distribution of international students within destination countries in the European Union, in terms of main countries and regions of origin. Such an approach allows illustrating a host country's attractiveness for students from a specific geographical area as well as from a political or economic entity. The results are of a descriptive nature, displaying four types of cross-border student mobility:

- intra-European mobility
- students from EFTA countries
- inbound mobility from OECD countries (net EU countries)
- mobility of students from other countries (equal to worldwide net EU, EFTA and OECD countries, subsequently also referred to as 'third countries' or 'other countries')

The data is taken from the UNESCO Institute for Statistics database and covers the years 2007 to 2012, with a maximum number of 218 possible countries of origin[11].

[11] This number includes seven geographical residual categories for students with 'unknown' source countries, one within each of the larger geographical units (Africa, Asia, Caribbean and Central America, Europe, North America, South America, and Oceania).

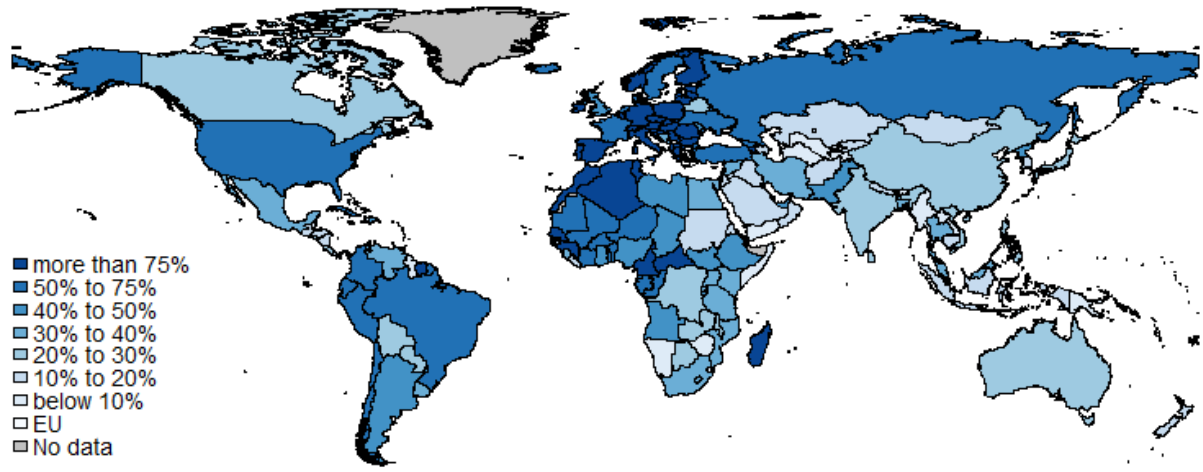
Figure 5. Origins and absolute numbers of incoming non-EU students studying in the EU, 2012



Source: UNESCO Institute for Statistics, education database; own calculations and representation

27. Due to the fact that host countries' population size, and thus also the size of the higher education system varies considerably, the remainder of this section is divided into two parts. The first part presents absolute enrolment figures of internationally mobile students to assess the relative attractiveness of destination countries based on raw numbers. Absorptive capacity of a host country's tertiary educational system is accounted for in the second part, by adjusting these numbers by the size of the respective HE system. For each EU host country the value from 2012, if available, and a five year change rate of the corresponding indicator will be reported.

Figure 6. Shares of outgoing students with EU as destination, 2012



Source: UNESCO Institute for Statistics, education database; own calculations and representation

A first impression regarding the attractiveness of the EU Higher Education Area can be obtained from Figure 6. Though Chinese students are the largest group of international students in the EU in absolute numbers (see Figure 5), their overall preference for studying in the EU is relatively small: only 23 percent of all Chinese students studying abroad came to the EU in 2012. In case of another newly industrialising country, i.e. Brazil, students favour the EU clearly – 58 percent chose an EU member state as destination for their studies abroad.

2.2.1 Absolute numbers of international students in EU host countries

28. Europe offers a large selection of possible destination countries, all providing a rich variety of structured programmes in tertiary education. Though the Bologna process contributed substantially to a harmonization of tertiary education, there still remain distinct features of each potential destination country: the spoken language in daily life, the main language used in courses at HE institutions, cultural peculiarities and economic conditions.

29. As highlighted in the literature review, these distinct features can be expected to affect the choices of international students regarding the preferred host country during their studies. Table 1 presents an overview for 2012 of absolute figures for internationally mobile students enrolled in the current 28 member states of the European Union, by source regions.

30. Unsurprisingly, the largest number of incoming students (426875) was in 2012 enrolled at a university in the UK. France and Germany attracted the second (256261) and third highest number (191734) of international students. This picture corresponds to a large extent to the size of a destination countries' tertiary educational sector. Other leading destinations were Italy, Austria, Spain and the Netherlands which attracted in 2012 between 55000 and 77000 internationally mobile students. With a total number of 39128 enrolled international students, the Czech Republic was the leading destination country in Central-Eastern Europe in 2012.

Table 1.Internationally mobile students, by host country and region of origin, 2012

Host country	EU		EFTA		OECD (net EU & EFTA)		Other countries		Unknown countries+		Total
	no.	%	no.	%	no.	%	no.	%	no.	%	no.
Austria	43406	74.8%	579	1.0%	3580	6.2%	10464	18.0%	0	0.0%	58029
Belgium	15324	63.6%	101	0.4%	1017	4.2%	7586	31.5%	83	0.3%	24111
Bulgaria	625	5.6%	19	0.2%	5299	47.3%	5271	47.0%	0	0.0%	11214
Croatia	195	27.2%	5	0.7%	39	5.4%	457	63.7%	21	2.9%	717
Cyprus	2540	34.1%	1	0.0%	17	0.2%	4896	65.7%	0	0.0%	7454
Czech Republic	28102	71.8%	301	0.8%	583	1.5%	10005	25.6%	137	0.4%	39128
Denmark	13855	65.4%	3891	18.4%	580	2.7%	2847	13.4%	15	0.1%	21188
Estonia	1110	64.5%	12	0.7%	109	6.3%	489	28.4%	0	0.0%	1720
Finland	4182	23.8%	129	0.7%	1067	6.1%	12204	69.4%	0	0.0%	17582
France	47796	18.7%	2295	0.9%	15768	6.2%	188185	73.4%	2217	0.9%	256261
Germany	53749	28.0%	9856	5.1%	26234	13.7%	84804	44.2%	17091	8.9%	191734
Greece*	15328	53.7%	36	0.1%	512	1.8%	12660	44.4%	0	0.0%	28536
Hungary	9095	51.9%	923	5.3%	2301	13.1%	5201	29.7%	0	0.0%	17520
Ireland	4351	41.4%	68	0.6%	1961	18.6%	4138	39.3%	0	0.0%	10518
Italy	19073	24.8%	951	1.2%	4588	6.0%	52367	68.0%	56	0.1%	77035
Latvia	1313	48.4%	106	3.9%	131	4.8%	1164	42.9%	0	0.0%	2714
Lithuania	311	9.9%	15	0.5%	181	5.8%	2631	83.8%	0	0.0%	3138
Luxembourg**	1757	79.0%	7	0.3%	60	2.7%	384	17.3%	17	0.8%	2225
Malta	276	46.8%	2	0.3%	57	9.7%	255	43.2%	0	0.0%	590
Netherlands	40045	72.3%	715	1.3%	2440	4.4%	12073	21.8%	147	0.3%	55420
Poland	5799	24.7%	1536	6.5%	2035	8.7%	13605	57.9%	538	2.3%	23513
Portugal	7315	39.5%	108	0.6%	623	3.4%	10468	56.5%	7	0.0%	18521
Romania*	3826	23.9%	85	0.5%	1588	9.9%	10515	65.6%	20	0.1%	16034
Slovakia	7537	83.2%	396	4.4%	125	1.4%	1001	11.0%	0	0.0%	9059
Slovenia	1187	51.9%	1	0.0%	33	1.4%	1059	46.3%	8	0.3%	2288
Spain	16767	30.1%	337	0.6%	5454	9.8%	33077	59.4%	11	0.0%	55646
Sweden	6670	28.3%	755	3.2%	1634	6.9%	14451	61.3%	81	0.3%	23591
United Kingdom	131348	30.8%	7298	1.7%	36843	8.6%	246537	57.8%	4849	1.1%	426875
EU 28*	482882	34.4%	30528	2.2%	114859	8.2%	748794	53.4%	25298	1.8%	1402361

Source: UNESCO Institute for Statistics, education database; own calculations

Note: *includes most recent values from 2011

**most recent values from 2010

+no precise information with respect to students' country of origin available, only rough geographical region is known (Africa, Asia, Caribbean and Central America, Europe, North America, South America, and Oceania)

31. The ranking of countries is different when enrolment of EU students is compared with that of non-EU students. More than two thirds of internationally mobile students originate from another EU country in the case of Slovakia, Luxemburg, Austria, the Netherlands and the Czech Republic. In 12 member states, no more than one out of three international students originates from another EU-country - this includes the five most populated EU countries. Intra-European student mobility is thus more important in smaller countries.

32. Students from third countries (other countries of origin, not members of EU, EFTA or OECD) constitute the largest share in Lithuania. However, this is due to its direct neighbour Belarus, which accounts for almost 40 percent of enrolled students from third countries. The highest absolute numbers of inbound students from other countries are hosted in the United Kingdom, France, Germany, Italy and Spain. Seemingly, most populated countries respectively larger economies attracted most students from third countries. Within this group of five countries, France has with 73.4 percent the largest share of third country students, and Germany with 44.2 percent the lowest.

33. Table A. 1 (in the appendix) shows the Top Five of source countries for each EU member state, excluding other EU or EFTA countries. In 11 out of 15 old (pre-2004) EU member states, Chinese students

constitute the largest or second largest group of international students from outside the EU or EFTA. This source country's relevance could be interpreted not only as reflecting the massive number of young Chinese, but also as an outcome of the new global geographies: Since there occurs a shift of multi-national corporations' R&D expenditures towards China as one new geographic focus (Bruche, 2009, p. 274), its economy will naturally display an increasing demand for highly qualified employees in R&D. And most likely, a substantial fraction of this increased demand initially will be met by hiring employees having received tertiary education abroad.

34. The Top Five also suggests the importance of geographical proximity and persistent implications of historical or colonial ties. Geographical proximity facilitates travel and the exchange of information. Furthermore, it implies often a certain degree of cultural similarity. All those factors might affect the costs of mobility in an advantageous way, either by decreasing uncertainty or by reducing monetary costs of student mobility. The impact of historical or former colonial ties appears not to be restricted to students, but is also found for immigration towards OECD or EU countries in general (see e.g., DeWaard et al., 2012; Ortega, 2009) and appears to be increasing for certain countries[12] (Hooghe et al., 2008).

35. Historical or colonial ties could exert an effect on today's students' choices in a twofold way: first, there are often well established institutional co-operations or programmes between HE institutions or an ongoing thought exchange on a governmental or administrative level. These links can contribute to lowering uncertainty about what to expect abroad. This can be observed for the Eastern European countries having joined the EU in the 2004 enlargement: predominant other source countries are Russia or other former members of the onetime Eastern Bloc - even more than two decades after it ceased to exist. Second, colonial ties often imply a shared language, as for all of the Portuguese Top Five source countries. A common language in turn eases daily life and facilitates the learning process at university (Perkins and Neumayer, 2013).

36. Bringing these descriptive findings together highlights that population's composition of third country students in EU countries is partially history-dependent, and partially the result of an increasing economic and demographic weight of emerging economies.

37. Within a global market for higher education, the EU is the most important destination region: EU countries which were also OECD members attracted almost 31 percent of foreign students worldwide in 2011, followed by North America where 21 percent of all foreign students are enrolled in tertiary education (OECD, 2013, p. 306). Within the EU, especially the United Kingdom strongly increased its market share concerning tertiary education for foreign students within one decade. During the same period, the global number of students enrolled outside their country of citizenship increased from 2.1 million in 2000 to 4.3 million in 2011 (OECD, 2013, p. 306).

38. This dramatic rise in the number of internationally mobile students can be observed in almost every single EU member state: since 2007, only Ireland and Croatia recorded a decline in the overall number of international students. The increase is to a large extent caused by rising intra-European mobility, but is bolstered by rising numbers of students from third countries.

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[12] Hooghe et al. (2008, p. 502) stated that "[e]specially countries like Spain, Portugal, Italy, and France increasingly attract immigrants from their former colonies", which points even to a persistent importance of colonial ties in the future.

39. As Table 2 reveals, most EU countries[13] hosted higher number of internationally mobile students in 2012 than they did five years earlier. Amongst those countries, 13 recorded an even higher increase for third country student mobility compared with intra-European student mobility. Belgium, Spain and Lithuania have seen the number of internationally mobile students from third countries triple in five years.

40. In contrast to this development, Germany was the only major host country to experience a decline - of almost 12 percent - in students from non-OECD/EU/EFTA countries, although this may be a statistical artefact.[14]

[13] At the reference period 2007, two of those 28 countries have acceded to the European Union in this exact year (Bulgaria and Romania), and Croatia was not yet a member state.

[14] the number of enrolled international students without clear information on country of origin rose to 17,000, possibly explaining this decline.

Table 2.Percentage change of internationally mobile students between 2007 and2012

Country of study	EU	EFTA	OECD (net EU & EFTA)	Other countries	Total
Austria	45.9%	-0.7%	2.7%	8.1%	33.4%
Belgium	17.7%	74.1%	188.1%	224.7%	52.5%
Bulgaria	-54.9%	n	135.1%	-3.4%	23.2%
Croatia	39.3%	n	105.3%	-86.0%	-79.0%
Cyprus	276.9%	n	-34.6%	0.2%	33.3%
Czech Republic	51.4%	20.4%	19.2%	102.9%	61.2%
Denmark	128.9%	26.7%	-56.1%	38.1%	68.9%
Estonia	63.7%	-60.0%	473.7%	104.6%	78.1%
Finland	26.4%	-1.5%	63.1%	107.3%	75.9%
France	9.7%	13.5%	10.7%	14.0%	13.1%
Germany	-21.3%	258.0%	23.3%	-11.9%	0.9%
Greece*	16.3%	50.0%	33.3%	71.1%	35.9%
Hungary	6.1%	18.9%	75.8%	16.9%	15.9%
Ireland	-23.3%	-56.4%	-39.6%	-7.7%	-28.5%
Italy	4.0%	-38.2%	38.7%	64.3%	39.8%
Latvia	100.8%	562.5%	235.9%	60.8%	89.4%
Lithuania	-61.4%	66.7%	-37.4%	229.7%	65.1%
Luxembourg**	n	n	n	n	n
Malta	n	n	n	n	n
Netherlands	189.7%	286.5%	289.2%	167.7%	188.8%
Poland	120.6%	66.4%	52.5%	67.2%	80.6%
Portugal	178.0%	12.5%	99.0%	-29.7%	3.2%
Romania*	212.6%	844.4%	102.0%	43.2%	71.2%
Slovakia	660.5%	165.8%	-37.2%	78.1%	376.5%
Slovenia	49.1%	n	266.7%	176.5%	92.3%
Spain	107.3%	51.8%	100.1%	221.8%	161.1%
Sweden	-19.5%	98.2%	1.7%	1416.4%	110.0%
United Kingdom	15.8%	37.3%	-4.3%	32.6%	24.4%
EU 28*,**	25.6%	63.2%	16.2%	28.5%	28.7%

Source: UNESCO Institute for Statistics, education database; own calculations

Note: *includes most recent values from 2011, Unknown countries not shown.

**includes most recent values from 2010

+no precise information with respect to students' country of origin available, only rough geographical region is known (Africa, Asia, Caribbean and Central America, Europe, North America, South America, and Oceania)

n number of international students was in 2007 below 5 or missing

41. While EU countries appear to be attractive destinations for a rising number of European and third country students, increases are not equally distributed. Host countries which had lower levels of student mobility in the past now display higher growth rates. The United Kingdom, however, not only maintained its top position but actually saw enrolment increase by one third between 2007 and 2012.

2.2.2 Inbound ratios – international student mobility from a relative point of view

42. Does the growing number of international students lead to a change in the composition of the total student body or does it merely reflect the expansion of the tertiary educational system? To answer this, the relative size of international student mobility compared to total enrolment in tertiary education in a respective host country is examined.

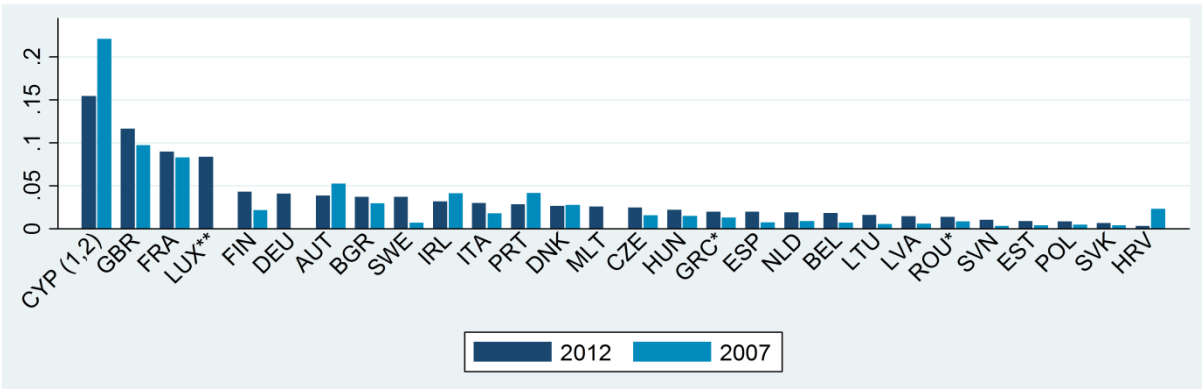
43. Table A. 2, as well as Figures 7 and 8, present the inbound ratios for the years 2007 and the most recent years for the 28 EU member states. This ratio is calculated for each of the source and host countries as

$$IR_{ij,t} = \frac{I_{ij,t}}{E_{i,t}} \qquad \text{(eq. 1)}$$

where $I_{ij,t}$ is the total number of students from region j studying in country i at a given year t, and $E_{i,t}$ is total tertiary enrolment in the host country. The latter variable is the sum of domestic students and international students from all J countries of origin $E_{i,t} = \sum_{j=1}^{J} I_{ij,t} + D_{i,t}$.

44. Figure 7 gives some indication regarding the changing importance of third country students by depicting the inbound ratios in the years 2007 and 2012 (or the most recent year available), by individual country of study.

Figure 7. Inbound ratios for international students from non-EU countries, 2007 and 2012



Source: UNESCO Institute for Statistics, education database; own calculations

Note: * most recent values from 2011

** most recent values from 2010

45. The majority of countries experienced a growing share of third country students. A number of countries have, however, seen declines: Austria, Ireland and Portugal, principally. In the case of Austria, the decrease is primarily attributable to a considerable drop of the enrolment of students from China as well as Bosnia and Herzegovina. For Ireland and Portugal, the disadvantageous economic developments in the analysed time horizon serve as likely explanations.

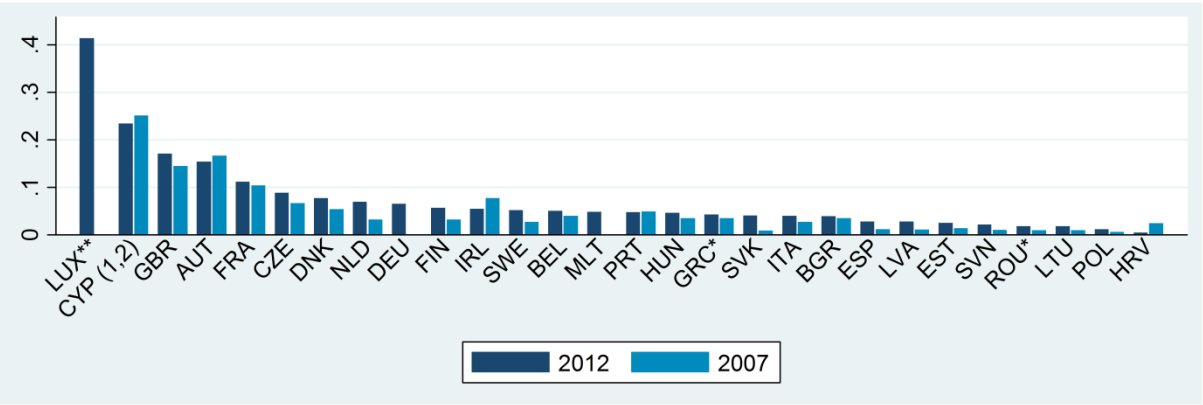
46. How successful was the European Union overall with respect to attracting international students? In relation to enrolment of domestic students a distinct answer can be given: Overall, the European Union saw an increase in the weighted[15] inbound ratio of third country students from 2.9 to 3.8 percent (EU students: 1.9 to 2.4 percent). The average increase in third country student inbound ratio in the EU 28 is not driven by the rising enrolment of international students in the UK, but by a rather evenly spread increase in internationalisation across the EU. Excluding the UK from the average still yields an increase of 0.7 percentage points (instead of 0.9 percentage points) on the aggregate level.

15 The weighting procedure accounts for substantial differences in the size of the tertiary educational sectors of the examined countries. Each country-level inbound rate was weighted by the number of students enrolled in this specific county, $E_{i,t}$. Germany and Luxembourg are not included as no corresponding figures for 2007 are available.

47. Whilst an analysis of absolute numbers for all internationally mobile students previously (chapter 2.2.1) portrayed an unbalanced development, the overall trend relative to the size of their tertiary educational system is once again similar across countries, as indicated by Figure 8.

48. The inbound rate for all internationally mobile students in the EU rose from 2007 to 2012 by 1.5 percentage points on average. Consequently, international students represent a larger share of the tertiary educational system within the European Union. Such findings give rise to the hypothesis that the absorptive capacity of HE institutions evolves in a comparable manner across EU member states.

Figure 8. Inbound ratios for all internationally mobile students, 2007 and 2012



Source: UNESCO Institute for Statistics, education database; own calculations
Note: * most recent values from 2011
** most recent values from 2010

49. Aside from Luxembourg (figures from 2010) with by far smallest tertiary educational system in the EU, Austria and Cyprus have the highest inbound rates referring to intra-EU mobility (see Table A. 2 in the appendix). In the first case, a substantial number of German students, studying at universities in the neighbouring country in the South-East, inflates this value; in the latter case, the result is mainly driven by Greek students. Among large EU countries, only the United Kingdom has such a high share of EU students enrolled at its tertiary institutions. In 2012, the share of European students in total enrolment in France, Germany, Italy and Spain was lower than in Slovakia, the Czech Republic, the Netherlands and Denmark.

50. When third country students are considered, the picture changes: France experiences large inflows from Morocco, Tunisia and Algeria, pushing it into the Top three of destination countries. The fifth and sixth highest inbound ratios, referring to third country students, can be found for Finland and Sweden. Though these two countries rank relatively low as a destination for European students, they successfully attract students from third countries. For most Eastern European countries, in contrast, the shares of students from other countries are almost negligible.

51. From an aerial perspective, looking at the European Union as a whole, the share of international students enrolled increases. Universities across the EU become more diverse with respect to students' origins. This increase is in line with one of the major goals of Council Directive 2004/114/EC, namely "[p]romoting the mobility of third-country nationals to the Community for the purpose of studies" (European Commission, 2004, p. 1).

52. Whilst previously described patterns provide credible evidence that the European Union is an increasingly attractive place for temporary studies it yet has to be determined whether the EU is also attractive to international graduates in a short-, medium- or long-run.

2.3 Gender distributions of international students

53. Studying abroad is not only an important aspect from an educational point of view, enlarging the intellectual horizon and strengthening human capital. It offers also the opportunity for academic exchange, and to participation in cultural or daily life of the destination country. Yet, there might be an alternative aspect of participation which could provide valuable insights into the attractiveness of the EU Higher Education Area, namely women's participation in international tertiary education. While the data structure prevents conducting analyses on the source country level, it is possible to look at the time series from 2002.

54. Table A. 3 (in the appendix) contrasts inbound rates of male and female international students, giving information on the gender-specific share of international students in relation to the respective gender's enrolment numbers in a given country. For roughly 50 percent of the country-year observations the ratios are balanced. For the majority of other cases, the female inbound ratio is at least 20 percent larger or smaller than the corresponding male rate. Usually, the latter case prevails.

55. As the presented numbers are ratios, the gender difference is not to be interpreted at face value since its causes cannot be unambiguously determined. Gender differences within countries could emerge either from gender differences between inbound numbers or differences between gender-specific enrolment numbers, the latter primarily caused by domestic student enrolment. Hence, presented ratios for the three observation points in time should be interpreted with caution in a within-country context.

56. Despite this limitation, the ratios provided can be used to evaluate between-country differences with respect to attractiveness on international students of a given gender in a specific year. What can be derived is that for instance Austria draws more female international students than Denmark in relation to each countries female total enrolment numbers (15.3% vs. 7.3% in 2012). Countries with relatively fewer women than men include Bulgaria, Cyprus, Finland, Hungary, Romania and Sweden.

Table 3. Absolute inbound numbers by gender for 2002, 2007 and 2012

	2012			2007			2002		
	female	male	f/m	female	male	f/m	female	male	f/m
Austria	30833	27223	1.13	23454	20118	1.17	14726	13726	1.07
Belgium	23711	19203	1.23	15335	9867	1.55	19982	20372	0.98
Bulgaria	4074	7140	0.57	3783	5317	0.71	3124	4874	0.64
Croatia	410	432	0.95	1801	1687	1.07	301	402	0.75
Cyprus	2407	5047	0.48	1302	4288	0.30	1134	1924	0.59
Czech Republic	20877	18578	1.12	12543	11940	1.05	4620	5133	0.90
Denmark	11596	10765	1.08	7553	5142	1.47	n	n	n
Estonia	n	n	n	508	458	1.11	n	n	n
Finland	7155	10481	0.68	4456	5610	0.79	3037	3723	0.82
France	141352	130047	1.09	122949	123663	0.99	n	n	n
Germany	110405	96581	1.14	n	n	n	n	n	n
Greece*	16398	16430	1.00	n	n	n	n	n	n
Hungary	8613	8907	0.97	7101	8009	0.89	5370	6412	0.84
Ireland	n	n	n	10006	6752	1.48	4797	4409	1.09
Italy	45526	32206	1.41	33673	23598	1.43	15972	12475	1.28
Latvia	1279	1437	0.89	n	n	n	1652	1609	1.03
Lithuania	1816	1322	1.37	918	983	0.93	209	475	0.44
Luxembourg**	1134	1092	1.04	n	n	n	n	n	n
Malta	324	267	1.21	345	262	1.32	104	246	0.42
Netherlands	32140	25369	1.27	15685	11764	1.33	9673	9201	1.05
Poland	11835	11690	1.01	6564	6457	1.02	3968	3412	1.16
Portugal	9933	8592	1.16	8601	9349	0.92	n	n	n
Romania*	6721	9354	0.72	4297	5086	0.84	4519	6089	0.74
Slovakia	4771	4288	1.11	924	977	0.95	673	970	0.69
Slovenia	1367	990	1.38	685	510	1.34	469	482	0.97
Spain	29947	25812	1.16	18157	14124	1.29	25169	19691	1.28
Sweden	12351	16278	0.76	10436	11699	0.89	13114	15550	0.84
United Kingdom	212078	215608	0.98	167564	183906	0.91	110139	117134	0.94

Source: UNESCO Institute for Statistics, education database; own calculations

Note: * most recent values from 2011 instead of 2012
** most recent values from 2010 instead of 2012
n no data available

57. To address the question which countries are relatively more attractive for female international students, Table 3 presents gender specific enrolment figures[16]. Observable female/male enrolment ratios for internationally mobile students show that there might be some destination countries which are persistently preferred by one sex, compared to the other. Austria, Italy, the Netherlands and Spain display at all three reference points a larger number of female international students.

58. The overall picture shows varying relative participation of female international students across countries. But why are there substantial differences in internationally mobile students' preferences between the two sexes?

59. Two main mechanisms could be driving this outcome: First, one should remember that host countries display a heterogeneous composition of their international student body with regard to students' origins – some have a larger share of students from other EU member states, others a higher share from other continents (see Table 1 and Table 2). Aside from general socio-cultural differences between countries of origin and destination countries, distance could matter as well.

[16] The underlying data source provides only aggregate figures and an inbound rate for female students, thus absolute figures for male and female enrolment of internationally mobile students have to be 'recovered'.

60. Keeping the possibly mobility-deterring effect of distance in mind, there is evidence that willingness to migrate is associated to individual risk attitudes: less risk-averse individuals are more willing to migrate (Jaeger et al., 2010; Nowotny, 2010). At the same time, women tend to be more risk-averse in general than men (Dohmen et al., 2011), or even when several definitions of risk domains are separately investigated (see e.g., Charness and Gneezy, 2012; Nicholson et al., 2005). There is even some evidence of a relationship between risk attitude and migration patterns on the level of short- to medium distance migration, when it comes to students' choice of a study location (Weisser, 2015b).[17]

61. In addition, gender-specific returns to education abroad might be influential as well: if studying abroad was associated with a certain risk and women's marginal returns to the acquisition of transnationally applicable human capital were lower, they would benefit less from studying abroad at more remote destinations than their male fellow students. Consequently, if a host country was particularly attractive to students from a specific remote country of origin, e.g. due to historically established connections, it might be that only the most risk-seeking students with highest expected returns would embark on the journey of studying several years abroad. This could explain higher inbound numbers of male students in some countries.

62. A second driving force of gender imbalances regarding numbers of inbound students could reflect the portfolio of study programmes and access criteria in the tertiary educational system itself. If a country had an especially strong focus on engineering sciences, it would plausibly attract a larger share of those international students who are interested in such programmes. Gender differences concerning enrolment preferences are known from domestic students and could apply to international students as well. For example, Charles and Bradley (2009) examined students' enrolment choices in 44 developing, transitional or industrialised countries and show that women are underrepresented in the field of engineering in all countries and overrepresented in the field of humanities and social sciences. Barone (2011) concentrated on eight European countries and points to distinct gender differences in graduation numbers on a finer grid of 14 different fields of study. He, too, identified gender-related preference disparities which are also remarkably stable over time. Thus, regardless of the economic development of source or destination countries, there remain substantial differences in gender-specific tastes.

63. Plausibly, this will also come into play when it comes to enrolment at a European university, and accordingly, gender-specific inbound rates will be affected.

2.4 Internationally mobile students by field of study

64. As the choice of a specific destination country or a receiving institution will be heavily influenced by the programmes and curricula offered, international students preferences for various fields of studies will be examined in this paragraph. Overall, there is credible evidence that some sorting of students into specific host countries occurs according to their tastes for a given field. At the same time, the distribution of preferences implies that internationally mobile students do not display a higher preference for the STEM fields in general.

Table 4. Relative study preferences of internationally mobile students, 2012

	student type	total enrolment (ISCED 5 + ISCED 6)	Education	Humanities and arts	Social sciences, business and law	Science, mathematics and computing	Engineering, manufacturing and construction	Agriculture and veterinary	Health and Welfare	Services	Unknown field
Austria	int.	58056	5.6%	17.2%	39.0%	11.9%	14.0%	1.9%	8.7%	1.5%	0.3%

[17] i.e., even over short distances, the more risk-averse the student, the less s/he will want to migrate

	all	376498	15.0%	12.5%	35.6%	10.9%	14.6%	1.3%	7.6%	2.4%	0.2%
Belgium	int.	42926	2.7%	13.5%	20.7%	8.2%	13.9%	5.0%	33.7%	2.3%	0.1%
	all	477712	11.4%	10.0%	29.0%	5.2%	10.5%	2.4%	23.3%	1.8%	6.4%
Bulgaria	for.	11280	6.7%	5.0%	16.3%	3.9%	21.5%	1.4%	37.5%	3.9%	3.7%
	all	284995	6.6%	7.6%	40.5%	5.3%	19.2%	2.3%	7.6%	8.5%	2.3%
Croatia	int.	842	n	n	n	n	n	n	n	n	n
	all	157289	4.0%	9.5%	40.3%	8.5%	15.8%	3.9%	9.3%	8.7%	n
Cyprus	int.	7454	4.0%	9.6%	72.9%	6.8%	2.8%	0.1%	1.6%	2.2%	0.0%
	all	31772	9.5%	10.9%	45.6%	8.8%	12.0%	0.5%	7.9%	4.7%	n
Czech Republic	for.	39455	3.7%	9.4%	39.0%	15.5%	10.7%	2.3%	15.7%	3.3%	0.3%
	all	440230	12.0%	9.3%	31.9%	11.4%	13.5%	3.8%	11.1%	5.2%	1.7%
Denmark	int.	22363	1.9%	9.7%	41.2%	10.8%	20.8%	4.0%	10.6%	1.0%	0.0%
	all	275009	9.6%	12.7%	33.9%	8.3%	10.8%	1.5%	20.8%	2.4%	n
Estonia	int.	1573	0.4%	17.4%	51.0%	8.5%	6.4%	9.6%	6.2%	0.5%	0.0%
	all	67607	7.5%	13.6%	32.8%	11.5%	14.8%	2.2%	9.7%	7.9%	n
Finland	int.	15636	1.7%	9.2%	27.9%	11.5%	32.0%	1.6%	9.1%	6.9%	0.0%
	all	308924	5.0%	13.8%	23.2%	9.9%	24.1%	2.2%	16.5%	5.4%	n
France	for.	271399	1.4%	18.3%	40.7%	17.1%	13.5%	0.3%	7.1%	1.7%	0.1%
	all	2296306	2.5%	13.4%	38.1%	11.6%	13.4%	1.1%	16.0%	3.4%	0.4%
Germany	int.	184594	5.2%	19.2%	26.5%	14.7%	23.9%	1.7%	6.5%	1.5%	0.7%
	all	2939463	7.7%	12.9%	25.9%	14.5%	18.3%	1.5%	16.4%	2.6%	0.2%
Greece	for.	29012	5.2%	13.5%	31.3%	13.4%	18.4%	3.2%	13.0%	1.9%	0.0%
	all	663698	6.3%	14.3%	31.5%	15.0%	17.6%	4.5%	7.9%	2.8%	0.1%
Hungary	int.	17520	2.6%	9.3%	18.6%	4.2%	9.0%	8.9%	44.3%	3.2%	0.0%
	all	380757	6.8%	9.1%	39.4%	7.4%	15.2%	2.5%	9.7%	10.0%	n
Ireland	int.	11100	n	n	n	n	n	n	n	n	n
	all	192647	5.4%	17.1%	25.4%	16.4%	11.7%	1.7%	17.2%	4.2%	0.8%
Italy	for.	77732	1.8%	19.3%	31.8%	5.9%	21.0%	1.7%	16.4%	1.6%	0.4%
	all	1925930	5.5%	14.6%	34.0%	8.0%	16.3%	2.3%	15.0%	2.8%	1.3%
Latvia	int.	2716	1.2%	6.7%	47.0%	3.0%	5.3%	0.1%	25.0%	11.7%	0.0%
	all	97041	6.7%	9.3%	43.3%	6.6%	14.5%	1.3%	10.4%	7.9%	n
Lithuania	int.	3138	7.5%	14.0%	60.3%	0.8%	2.7%	0.1%	14.4%	0.2%	0.0%
	all	175066	9.1%	7.6%	45.5%	5.5%	16.7%	2.2%	10.4%	3.0%	n
Luxembourg	int.	2468	4.8%	9.4%	61.2%	15.2%	4.7%	1.0%	3.8%	n	0.0%
	all	6085	16.5%	11.2%	46.3%	11.0%	7.2%	0.4%	7.3%	n	n
Malta	int.	591	6.3%	10.0%	35.4%	11.0%	3.4%	0.2%	26.2%	7.6%	0.0%
	all	12203	10.1%	13.2%	33.2%	12.7%	8.2%	0.3%	20.4%	2.0%	n
Netherlands	int.	57509	1.9%	12.9%	42.8%	6.5%	10.5%	1.6%	13.9%	8.3%	1.6%
	all	793678	11.2%	8.0%	38.8%	6.5%	7.9%	1.1%	17.4%	6.7%	2.4%
Poland	int.	23525	2.3%	11.2%	40.0%	5.6%	7.0%	1.2%	26.3%	6.4%	0.1%
	all	2007212	13.0%	9.0%	36.9%	8.0%	14.7%	1.7%	8.5%	8.1%	n
Portugal	int.	18525	5.4%	13.8%	36.5%	10.0%	17.7%	1.3%	7.5%	6.2%	1.5%
	all	390273	5.7%	9.5%	31.3%	7.2%	21.9%	1.9%	15.9%	6.4%	0.1%
Romania	int.	17219	1.1%	6.4%	20.6%	2.1%	11.5%	1.5%	54.4%	2.4%	0.0%
	all	705333	2.0%	8.5%	43.0%	5.8%	22.8%	2.6%	10.8%	4.5%	n
Slovakia	for.	9489	12.9%	5.2%	18.8%	2.0%	6.6%	1.8%	51.0%	1.6%	0.0%
	all	221227	12.5%	7.5%	30.6%	8.4%	14.8%	2.2%	17.8%	6.2%	n
Slovenia	int.	2357	4.7%	12.8%	33.3%	12.7%	18.1%	2.7%	9.9%	5.8%	0.0%
	all	104003	7.9%	8.7%	33.6%	7.5%	19.3%	3.1%	10.7%	9.2%	n
Spain	int.	55759	3.3%	7.9%	22.3%	5.4%	10.1%	1.3%	12.3%	2.6%	34.9%
	all	1965829	11.1%	11.0%	31.6%	9.5%	16.9%	1.5%	12.8%	5.5%	n
Sweden	int.	28629	2.2%	9.6%	24.1%	19.6%	31.1%	0.8%	10.9%	1.6%	0.0%
	all	453328	12.3%	13.5%	27.1%	9.3%	16.6%	1.0%	17.7%	2.4%	0.1%
United	int.	427686	2.7%	12.8%	45.5%	12.6%	14.2%	0.8%	8.6%	2.3%	0.5%
Kingdom	all	2495780	8.0%	16.5%	28.4%	13.7%	8.4%	1.1%	17.6%	1.7%	4.6%

Source: Eurostat, own calculations
Note: n no data available
int. refers to non-resident students (international students)
for. refers to non-citizen students (foreign students)
all refers to total enrolment (domestic and international/foreign students)

65. Table 4 demonstrates that internationally mobile students[18], coming to EU countries, have a high preference for social sciences, business or law programmes. In almost every EU country, where data

[18] The students' type indicates whether the underlying data refers to international or foreign students.

on internationally mobile students is available, international students are concentrated in those programmes.[19]

66. There is also a large fraction of internationally mobile students who chose Belgium, Hungary, Latvia, Poland or Romania in order to enrol in the field of health or welfare. Engineering, manufacturing or construction programmes draw internationally mobile students to Denmark, Finland, Germany and Sweden.

67. The fields of education, services, as well as agriculture or veterinary science are the least chosen from the perspective of internationally mobile students. Within the four most preferred fields of internationally mobile students, the dominating choices are humanities, business and administration, computing and engineering respectively.

68. Overall, there is credible evidence that some sorting of students into specific host countries occurs according to their tastes for a given field. At the same time, the distribution of preferences implies that internationally mobile students do not display a higher preference for the STEM fields in general.

2.5 Mobile students by study level and type

69. Further insights can be obtained from disaggregating the international student body by level of study. As the underlying goal of this work is an examination of factors which induce internationally mobile students from other countries to stay in Europe after graduation, special attention will be paid to post-graduate studies (ISCED 6).

70. There are two reasons to focus on post-graduate education. First, if someone obtained a first or second stage degree (Bachelor or Master, ISCED 5) within the EU Higher Education Area and choses then to stay for doctoral studies (ISCED 6), this can be seen as an indication of attachment to the host country and willingness to prolong the stay in general.

71. Furthermore, there is some evidence that PhD students are more inclined to stay in the host country than bachelor or master students after graduation (OECD, 2014). And, even if some international post-graduate students earned their first degree outside the EU, they would still contribute during their post-graduate studies to a host country's research output.

72. The average ratio of post-graduate (ISCED 6) internationally mobile students to internationally mobile students enrolled in a first-stage (ISCED 5) programme is 0.093[20] in 2012 for the EU 28 (Table 5). In the United Kingdom, for example, there is one international post-graduate student enrolled for ten first-stage international students.

73. In agriculture and veterinary science, although total enrolment numbers are low, there is a substantial share of international students coming to a European country for their doctoral education. Similarly, in the fields of science, mathematics and computing as well as engineering, manufacturing and construction, international PhD students have a more pronounced preference for studying in the EU than international bachelor and master students do.

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[19] Cyprus is the most obvious outlier. Here, almost 73 percent of international students are enrolled in the field of social science, business and administration.

[20] Each countries ratio is weighted by the total number of enrolled international students in this respective country.

Table 5.Relative preferences of internationally mobile students on the ISCED 6 level, by field in 2012

	student type	total ratio $\frac{ISCED\ 6}{ISCED\ 5}$	total number (ISCED 6)	Education	Humanities and arts	Social sciences, business and law	Science, mathematics and computing	Engineering, manufacturing and construction	Agriculture and veterinary	Health and Welfare	Services
Austria	int.	0.12	6010	0.03	0.13	0.08	0.20	0.14	0.17	0.14	0.05
Belgium	int.	0.13	4845	0.02	0.08	0.13	0.42	0.24	0.22	0.06	0.02
Bulgaria	for.	0.02	201	0.07	0.06	0.03	0.03	0.01	0.03	0.00	0.01
Croatia	int.	0.12	90	n	n	n	n	n	n	n	n
Cyprus	int.	0.01	49	0.00	0.03	0.00	0.02	0.05	0.00	0.02	0.01
Czech Republic	for.	0.09	3180	0.04	0.13	0.05	0.20	0.12	0.15	0.06	0.04
Denmark	int.	0.11	2135	0.00	0.07	0.02	0.23	0.22	0.47	0.11	0.00
Estonia	int.	0.14	198	cs	0.29	0.05	0.70	0.30	0.07	0.07	cs
Finland	int.	0.14	1970	0.40	0.26	0.09	0.26	0.10	0.55	0.24	0.03
France	for.	0.12	29875	n	n	n	n	n	n	n	n
Germany	int.	0.08	13900	0.09	0.09	0.03	0.18	0.06	0.35	0.09	0.04
Greece	for.	n	n	n	n	n	n	n	n	n	n
Hungary	int.	0.03	39	0.03	0.11	0.03	0.17	0.02	0.01	0.01	0.00
Ireland	int.	0.22	2026	n	n	n	n	n	n	n	n
Italy	for.	0.05	3905	0.03	0.02	0.03	0.24	0.08	0.22	0.03	0.00
Latvia	int.	0.03	79	0.23	0.01	0.05	0.03	0.04	cs	0.00	0.00
Lithuania	int.	0.00	10	n	n	n	n	n	n	n	n
Luxembourg	int.	0.15	324	0.13	0.16	0.07	0.57	0.51	0.00	0.09	cs
Malta	int.	0.01	6	0.00	0.00	0.01	0.07	0.00	cs	0.00	0.00
Netherlands	int.	0.09	4927	n	n	n	n	n	n	n	n
Poland	int.	0.03	601	0.00	0.12	0.01	0.15	0.03	0.02	0.00	0.00
Portugal	int.	0.12	1995	0.20	0.12	0.09	0.26	0.13	0.19	0.05	0.14
Romania	int.	0.03	447	n	n	n	n	n	n	n	n
Slovakia	for.	0.12	1034	0.03	0.28	0.33	0.40	0.27	0.04	0.05	0.36
Slovenia	int.	0.21	405	0.19	0.27	0.10	1.21	0.11	0.07	0.10	0.17
Spain	int.	0.08	3921	0.42	0.10	0.10	0.21	0.20	0.14	0.04	0.05
Sweden	int.	0.28	8133	0.06	0.05	0.08	0.51	0.27	1.41	0.91	0.27
United Kingdom	int.	0.10	38689	0.21	0.11	0.05	0.23	0.14	0.16	0.14	0.03

Source: Eurostat, own calculations

Note: n no data available

int. refers to non-resident students (international students)

for. refers to non-citizen students (foreign students)

cs cell size of respective ISCED 5 reference group below five

74. The descriptive statistics presented in this chapter point to the fact that the profile of international students in the EU higher education area is rather heterogeneous. Aside from an overall trend of rising numbers of international students enrolled in an EU country, there are important distinctions by students' origin, sex, designated study fields, and level of study. Concerning the ability to attract high-skilled individuals, and possibly to keep them, the ratio of international second-stage to international first-stage tertiary enrolment (Table 5) indicates that some countries seem to have a relatively more pronounced appeal than others. An alternative explanation might be that second-stage higher education institutions in these countries specifically target international candidates.

3 POST-GRADUATION STAY RATES IN THE LITERATURE

75. Attracting international students during the course of their studies is one possible way immigration can contribute to a knowledge economy. But how could the EU benefit from these talents after graduation?

76. Keeping a share of those graduates in Europe – the larger, the better – would contribute to this goal. Having examined the distribution of internationally mobile students within the European Union, the pool of potential stayers, the focus shall be shifted to the main part of this paper, namely understanding and empirically examining staying behaviour of international graduates.

77. The literature identifies several issues regarding the quantitative assessment of such staying behaviour: Precise identification of international students on a cross-country level is the first challenge. A second complication is the fact that internationally mobile individuals are often hard to track – if they graduate from university, they can easily disappear from the 'administrative radar' and in many cases it is virtually impossible to follow them, and therefore to calculate reliable stay rates.

78. Furthermore, staying behaviour is a dynamic phenomenon: although some international graduates decide to stay immediately after graduation in the host country, they may change their minds in a subsequent period – perhaps due to worsening economic conditions in the host country - and go back to their country of origin or a third country. Others may have planned right from enrolment to study and then gain initial work experience in a foreign country before returning after some years. Consequently, a cohort's stay rate immediately after graduation will almost surely decline as time passes. This stresses the importance of establishing stay rates' reference periods.

79. The following literature review[21] delivers a status quo picture, but also shines a light on potential pitfalls with respect to the chosen calculation method. These findings serve as foundation for an assessment of the feasibility and error-proneness of various proposed calculation methods in the extended version of this paper; only the main implications and results will be presented in chapter 4 of this paper.

80. There are two main branches in the literature on staying patterns of internationally mobile students, respective academics in general. One is dedicated to the examination of stay (or return) rates where the underlying implicit research question is *who stays or returns after having graduated abroad?* Here, students displaying degree-mobility are in the centre of interest and it is possible to derive stay rates in or return rates from a given host country, since information on host and source country is available.

81. The second branch, which does not directly address stay or return rates, is guided by the slightly different question *who chooses to start a career abroad after having spent some time during studies abroad?* In this line of research, the usual observation unit are students exhibiting credit-mobility and it is only known that they started their career either 'somewhere' outside their home country or they have returned from 'somewhere'. Since there are many similarities between conceptual approaches and discussed determinants, the second branch offers valuable insights with respect to locational choices of graduates.

82. In order to generate insights into observable staying behaviour, which is the prerequisite for any evaluation of stay or return rates, staying or returning *intentions* are left out. Publications covered in this

[21] This literature review is not exhaustive, but includes the most prominent publications from 2002 onwards, dedicated to stay or return rates of international or foreign academics, comprising students, graduates or researchers.

literature review represent authors' most recent version of a paper discussing truly observable stay or return decisions on an empirical basis.[22]

3.1 Credit mobility and the likelihood of starting a career abroad

83. Typically, research on the effects of studying abroad concentrates primarily on the improvement of language proficiency, intercultural skills or a change of individual attitudes or valuations. If authors try to establish a connection between working abroad and previous experiences as internationally mobile student, the data does not allow a comparison with a suitable reference group, i.e. non-mobile graduates (Bracht et al., 2006; Norris and Gillespie, 2009). This in turn makes it virtually impossible to infer a reliable effect of studying abroad.

84. The overall focus on soft skills, network and intercultural aspects also applies in the context of the few specifically designed long-term studies where authors used a suitable control group (Hansel, 2008; Paige et al., 2010). Actual labour market outcomes, and thus any possible dependency from earlier experiences abroad, are for the most part ignored. Instead, possible interconnections between credit mobility on the one hand and self-assessed 'employability', a vaguely specified 'international dimension' in the job or 'intentions to work abroad' on the other hand are examined.

85. Limiting the review to quantitative studies of actually observable or retrospectively reported episodes of employment abroad excludes a vast amount of small or medium scale survey publications, relying mainly on descriptive presentations.

86. Despite this restriction, a coherent picture arises in the investigated literature (see overview in the extended version of this paper): When non-mobile students are used as a reference group, studying abroad exerts an effect with respect to the chosen location of graduates' labour market entry.

87. For a short- to medium-term perspective (one to seven years after graduation), Parey and Waldinger (2011) and Di Pietro (2012) reported – whilst accounting for potential endogeneity of the decision to study abroad – that Erasmus participation increases likelihood of starting the working career abroad by 12 to 24 percentage points. Wiers-Jenssen (2008) presented smaller values, between 2 and 4 percentage points, which come close to the OLS-benchmark values of the first two publications. Oosterbeek and Webbink (2011) provided evidence that studying abroad also affects high achieving students, with a stay abroad lowering the likelihood of starting working life in the country of origin by 30 percentage points.

88. Enlarging the time horizon to two decades after graduation, Voin and Gérard (2013) as well as King and Ruiz-Gelices (2003) calculated probability differentials for those who studied abroad, finding that the share of those who ever worked abroad after graduation was between 9 and 17 percentage points larger within this group of formerly mobile students.

89. Overall, the limited literature on the relationship between international study experience and labour market entry location yields credible evidence for a positive and robust effect of student mobility on the likelihood of starting a career as an expatriate. Studying at least one semester abroad raises the likelihood of working after graduation in another country substantially, although the effect's magnitude

[22] Only the latest versions are cited, unless methodology and data source have changed.

may vary considerably between fields of study, type of mobility programme, and applied evaluation method[23].

3.2 Degree mobility and stay rates for specific countries

90. The type of cross-border mobility examined in this paragraph is mainly degree-mobility, since only this type of mobility can provide answers to the question '*How large is the share of internationally mobile students who stay in the host country after graduation*?'

91. All but one of the 41 publications covered are from the periods 2002-2014, hence the same timeframe that is also covered by this work's empirical part. The extended version of this paper comprises detailed tables with a comprehensive overview over the main findings from the literature review.

92. While all included publications address the phenomenon of international students' post-graduation mobility behaviour in one way or another, the procedures and data sources chosen varied widely. Furthermore, derived results vary depending on the precise group under scrutiny, observed field of study, combination of host and source country, time horizon, reference point in time etc.

93. The first conclusion to be drawn is that no unique stay rate for international students exists for a given country, but rather a multitude of stay rates. This reflects not primarily imprecise calculation methods or small sample sizes, but great variance in the angle of observation. As a special case for example, Ruiz (2014) ascertained even different stay rates related to varying levels of aggregation for the US: whilst one third stayed after graduation in the US, 15 percentage points of foreign students lingered even in the same metropolitan area.

94. Nonetheless, some central tendencies and common patterns can be derived for some types of bilateral stay rates or reference groups.

95. A substantial number of authors (e.g. Achato et al., 2011; Bratsberg, 1995; Guo, 2010; Merwood, 2007; OECD, 2011; Wilkinson et al., 2010) calculated stay rates based on permit status changes of former students: the number of status changers over international (foreign) graduates or students. This gives an idea how many international students have been granted (temporary) residence. Those studies relied on large sample sizes, but overall results are sensitive to administrative and legislative changes over time. Consequently, the figures presented should be interpreted as stay rates for individuals who were *allowed* to stay instead of those who *chose* to stay.

96. Short-term stay rates are much higher than medium-term stay rates (Finn, 2012; Ministeriet for Forskning, Innovation og Videregående Uddannelser, 2013; Nemeckova and Krylova, 2014; Suter and Jandl, 2006), reflecting a non-negligible subsequent emigration wave of initial stayers. The declining numbers of stayers stabilise in a longer perspective. Nevertheless, the dynamic aspect of a staying decision, which can be revised even years after graduation, is rarely accounted for directly. Only studies relying on a survey, or those tracking career histories (CIDA, 2005; Sage et al., 2013; Tian, 2013), provide information regarding repeated migration events in the context of international students' mobility. Unfortunately, they suffer from small or very small sample size, most times below 500 subject-specific observations (e.g. Badikyan, 2011; Bond et al., 2006; Lehr, 2008; Silver, 2012).

97. In general, medium- to long-run stay rates of doctoral students and researchers tend to be higher than those of undergraduate students (Gaule, 2011; van Bouwel and Veugelers, 2012; van de Sande et al.,

[23] Estimated coefficients of Oosterbeek and Webbink (2011), Parey and Waldinger (2011) and Di Pietro (2012) are larger in absolute magnitude since they are local average treatment effects.

2005). This may be linked to a different focus at the time of the decisions to go abroad, although it may also reflect greater returns to postgraduate degrees, or favourable policy settings for those with advanced degrees.

98. Students from countries with weaker economic conditions tend to display higher stay rates in economically more developed countries than their peers from other economically developed countries (Hein and Plesch, 2008; Vasiljev, 2014). Chinese and Indian international students are usually amongst those with highest stay rates (Achato et al., 2011; Wang, 2012; Zang and Li, 2002).

99. International students or researchers in a scholarship programme mostly leave the respective host countries after graduation (Hein and Plesch, 2008; Lehr, 2008; van de Sande et al., 2005). This is related to specific features of the scholarships, i.e. requiring students to leave after graduation. A second explanation is that such grants can be a component of a development aid programme in fields relatively more valued in source countries, for instance agriculture.

100. With respect to field of study, stay rates of international students enrolled in natural sciences or in a technical field tend to be higher than for those enrolled in social sciences and humanities. Retention rates are especially higher in the field of life sciences (Finn, 2012; Kim et al., 2011; Wolfeil, 2009).

101. Amongst those studies who reported gender-specific stay rates, results point to a more pronounced staying behaviour of female international students. Where there was a substantial difference between stay rates of the two sexes, male students are typically more prone to leave the host country after they graduated (Bijwaard, 2010; Vasiljeva, 2014).

102. Focusing on the EU, literature provides even more scarce guidance: only for approximately one third of the current 28 EU members stay rates could be found. Once again, stay rates vary between bilateral pairs of host and source countries (or regions), and across applied methodologies (Felbermayr and Reczkowski, 2012 presented for the EU a kind of upper limit of 71%). The highest rates can be observed for the UK, Germany, France, Denmark and the Netherlands - also five of the countries with highest per capita income. Aside from the Netherlands and Denmark, they also have the largest tertiary educational sectors. Also noteworthy is that stay rates based on permit data seem to be smaller than figures based on survey or administrative micro-data. This might be attributable to the fact that implemented surveys typically addressed a specific sub-sample of internationally mobile students, e.g. alumni of a university or participants in a scholarship programme. In these cases special effort is exerted to track members of the designated target group. Yet, if stayers had a higher response rate than returnees, as they first group might be easier to track, results would be skewed towards higher stay rates.

103. In the end, a non-conclusive picture emerges from the literature. There is an urgent need to develop a more coherent approach to evaluate stay rates of internationally mobile students. To conduct reliable between-country or between-group analyses, a robust methodological framework, underpinned by comparable and reliable data, is required.

3.3 Determinants of post-graduation staying behaviour

104. Having sketched some potential determinants of international students' initial locational choices in chapter 2, the extent to which those factors also contribute to international graduates' staying decision shall now be explored.

105. Some host country characteristics, e.g. a specific language or cultural similarities, might affect international students and graduates all alike. Other destination country features, such as labour market conditions around graduation time or work permit regulations might have a more severe impact on the decisions of graduates as they are immediately concerned.

106. In the literature on international student stay rates a number of publications assess determinants of international students' staying behaviour from a quantitative point of view. This subchapter summarises already identified determinants or promising candidates and evaluates their magnitude, as indicated in the literature.

107. As one of the first authors, Bratsberg (1995) investigated possible determinants of students' long-run stay rates in the US for a set of 69 countries of origin in an econometrical framework. Within his analysis special attention was paid to general economic and labour market differences between destination and source countries. He presented evidence that earnings variations in both countries played a significant role in explaining students staying behaviour. If earnings increased in the US by one standard deviation, the average stay rate rose by 3.2 percentage points. Similarly, a one standard deviation decrease in the source countries' labour income raised the long-term stay rate by 8.2 percentage points. Furthermore, higher degrees of income inequality or higher returns to education in the country of origin were associated with lower stay rates. Interpreting higher earnings variation as an indication of a relatively higher valuation of specific skills, this result points to the special importance of skills' valuation in the home country – if engineers were comparably poorly rewarded in the country of origin, international engineering graduates would prefer to stay in the respective host country. If the source country's GDP was to double, observed stay rate would decline on average by 5.5 percentage points. Bratsberg (1995) extended his empirical analysis also to non-economic aspects: increasing geographical distance coincided with a higher stay rate[24], so did stronger immigration ties between source and destination country.

108. In its evaluation of the Canadian Francophone Scholarship Program (CFSP), part of Canadian development assistance, CIDA (2005) pointed to factors which made some former scholarship holders stay in Canada. Amongst this group, the opportunity to bring one's family to Canada right from the start was mentioned as fostering staying behaviour. The desire to gather working experience in an industrialised country, specific job offers in Canada, respectively the lack of attractive job opportunities in the home countries were also major concerns of those who stayed. The general socio-political and academic culture in the host country, as well as non-deterring immigration regulations were referred to by survey participants as relevant reasons for staying.

109. In a discussion of brain circulation, Rosenzweig (2006) evaluated factors affecting the depreciation rate of foreign student stocks in the US[25]. He derived that if the skill price in the source country doubles, the stay rate decreased by 32 to 41 percent. Foreign students from Asian countries were in general less likely to stay in the US after they completed their study programme, but they were also found to react more sensitively to changes in skill prices.

110. Within their analysis of locational and work place choice of Dutch graduates, Venhorst et al. (2010) examined possible determinants of staying in peripheral regions of the Netherlands. They indicated that students born outside of Europe were in general much more likely to leave these regions for work abroad than to stay. This effect was even more pronounced for students from other European countries.

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24 If the distance between the home country's capital and the closest US gateway increased by 1000 miles, the stay rate increased by 3.4 percentage points. The distance was likely to capture monetary and psychological migration costs, thus staying would be a strategy to avoid the costs of re-migration to the country of origin.

25 Rosenzweig (2006) calculated a stock depreciation rate, using asan unadjusted numerator students with an F-1 visa who adjusted their status within a seven month period in 2003, rather than twelve months. In the model specification, GDP in the source country is excluded "as financing cost should not be a significant factor for the decision to return". Rosenzwieg's model of returning behaviour includes university ranking variables. In a subsequent version Rosenzweig (2008) accounts for average GDP growth but not the possible impact of overall wealth of a source country.

However, regions near a border successfully maintained high ability students from other countries, as they were more inclined to stay than to start a career abroad.

111. Conducting an analysis of life cycle migration to the Netherlands, Bijwaard (2010) applied several mover-stayer duration models which identified factors that influence the probability of becoming a stayer for several groups of migrants, including students. For students, he showed that the longer students stayed in the Netherlands, the less likely they were to leave. If students were older than 25 years when they arrived, they were also less likely to stay, but this effect diminished with increasing age. Accounting for re-migration events, after having left the Netherlands, the author derived long-run probabilities for residing in the Netherlands. Based on estimates, generated within the mover-stayer duration framework, he presented distinct results in comparison to a student reference migrant[26]: married or female international students[27] had a higher propensity to stay in the long-run in the Netherlands. This held true to an even larger extent for students from other European countries (non-EU members), Turkey, China or Africa. Students from English-speaking countries of origin, such as the UK, the USA or Canada, displayed either a similar or lower probability of staying as the reference student does. Students from new EU-members and Germany, in contrast, had a higher likelihood of staying – in the first cases economic differentials might matter, in the latter case geographical or cultural proximity could serve as possible explanations.

112. In a follow-up study Bijwaard and Wang (2013) shifted their analytical focus fully to international students and investigated the relevance of labour market and family formation dynamics after graduation too. Using a 'timing-of-events' approach they estimated the impact of employment or unemployment spells as well as of marriage on the hazard of leaving the Netherlands after graduation. The social factor 'marriage' reduced for sub-groups the hazard of returning, thus implies a prolonged stay in the Netherlands. Aside from the special group of students from Surinam or the Antilles, finding employment affected this hazard in the same way, but the impact was less pronounced. Unemployment spells affected students from different regions or origin in varying ways: students from EU-15 and EFTA countries, less developed countries and the afore-mentioned former colonies tended to return as reaction to individual unemployment. The opposite holds true for students from other developed countries.

113. Hein and Plesch (2008) used administrative data from a large Catholic scholarship-providing institution to evaluate determinants of return for scholarship holders from developing or transitioning countries who studied in Germany. Personal factors, such as age, having children or closer ties to the home country were found to be negatively related to the likelihood of staying. Network effects tended to increase only men's propensity to stay. Language proximity between the home country language and German predicted staying behaviour in a pronounced manner, as did the time spent in Germany. Women were also more likely to stay in general, and they reacted more sensitively to both factors. Hein and Plesch (2008) provided also some insights regarding the impact of economic and political factors: poor labour market conditions in the destination country or rising living standards in the country of origin made international students return, and the former seems to especially affect women's decisions. Greater economic or political freedom, and better living conditions for women in the home country, lowered the likelihood of staying after graduation. Regarding the source regions, students from Asia were less inclined to stay in Germany after graduation whilst historical ties operated in the opposite way for African students.

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26 The student reference migrant is defined as unmarried 21 year old male student originating from an EU15 or EFTA country, not including Germany, the UK and France. His long-run staying probability is 21 percent.

27 Most interestingly, the parameter estimate of females intensity to return (after having left) in the student sample is negative – if they leave once, they are less inclined to return than their male peers.

114. Scrutinising returning decisions of scientists who joined a US chemistry department during graduate studies or post-doctoral career, Gaule (2011) estimated a discrete-time model of the hazard of return. He derived that those who came during their graduate studies were only one third as likely to return as those who came as faculty. Recognising the potential impact of a selective stay or return decision he controlled for researchers' ability too: academic scientist within the highest category of productivity, measured as number of publications weighted by publishing journals' impact factors, were approximately twice as likely to stay in the US. Beyond individual factors he also evaluated the possible influence of source countries' characteristics on the staying behaviour. He found that if GDP per capita in a country of origin was to increase by USD 1,000, the odds of return were to increase by 20 percent. Considering a home country's scientific strength in the field of chemistry, measured as relevant publications in relation to its population, any significant impact on the staying decision disappeared when controlling for country's wealth.

115. Drawing from the Survey of Earned Doctorates (SED), Kim et al. (2011) examined determinants of staying behaviour for three cohorts (1980s, 1990s and 2000s) of foreign post-graduate students in the US in a large sample. The impact of age diminished in later cohorts whilst female graduates were persistently more inclined towards staying. His findings supported also the claim that students' attachment to a host country – as measured by continuing directly with post-graduate studies - is a non-negligible factor: those who came to the US for their undergraduate studies were twice as likely to stay after their PhD-Studies. Compared to the staying behaviour of the Canadian reference group, Chinese, Indian and Korean students were always much more likely to stay. Though Europeans and students from Africa displayed a higher likelihood too, they were less likely to stay than their peers from the three Asian countries. Cohort-specific patterns varied also by field of study: whilst earlier cohorts in any fields, aside from agriculture, were much more likely to stay than the reference group of biology-graduates, this pattern was reversed for the 2000s cohort, suggesting that conditions for biologists in the USA must have improved relative to those for graduates in other fields. Kim et al. (2011) also showed that staying behaviour is partially influenced by financial aspects: being funded as research or teaching assistant during the doctoral studies increased the likelihood of staying afterwards substantially compared to being self-reliant. On the other hand, receiving a fellowship and employer or foreign government financial support lowered the staying probability significantly.

116. Van Bouwel (2010) provided some descriptive evidence of factors affecting the locational choice of Europeans regarding the first job after graduation from doctoral studies in the US and a later career stage. The author explained that staying is more frequently chosen in later cohorts. Like Kim et al. (2011), she also highlighted the relevance of the funding source: those who chose to stay were less likely to be funded by an institution in the country of origin. Furthermore, stayers were much less likely to focus on a research topic related to Europe in their dissertation, but more likely to be involved in an US-specific topic. It can be concluded that providing funding and supporting host country-specific research topics might foster graduates attachment to a host country.

117. In a follow-up study, Van Bouwel and Veugelers (2012) investigated determinants of staying decisions of European doctoral students in the US incorporating scientific output measures. In addition to confirming the basic previous findings, they found a strong positive effect of funding by the host institution on the likelihood of staying after graduation. Additionally, being in a highly productive or supportive research environment, indicated by existence or impact of early publications, encouraged European graduates to stay. Conditioning on institutional quality or reputation, high-ability graduates chose high-quality institutions for their first job in general, preferably in the host country, but also in the source country over institutions with lower reputation. In this context, linguistic or cultural similarity seemed to affect staying behaviour once again, since graduates from English-speaking countries were much more likely to stay, irrespective of institutional reputation.

118. The entrenchment of doctoral students with their country of study was also highlighted by OECD (2014). International PhD graduates were found to be significantly more likely to remain in Norway after graduation, as were those who started a family. A further interesting finding was that having worked during studies in a field related to the field of post-graduation employment increased the likelihood of staying. Such job opportunities during studies might have served as entrance ticket to the labour market, e.g. either by granting more direct access to job networks or by providing more country and occupation specific human capital.

119. Reconstructing the careers of Chinese scientists in the field of mathematics, physics, chemistry and biology, Tian (2013) investigated possible determinants of return for those with a foreign doctoral degree from an English-speaking country. Based on a sample of 159 foreign degree holders (the small size is due to the biographical identification procedure of scientists' career history), the only highly significant determinant of return is the quality of the respective institution at which someone earned her or his doctorate. Compared to the reference group of higher education institutions in the lower six deciles of the Academic Ranking of World Universities ('Shanghai Ranking'), those with degree from the top decile were six times as likely to stay abroad, those from third to fourth decile still four times as likely to choose a career path abroad. This is an indication that institutional quality, e.g. research strength and reputation, may affect job market success and thus staying decisions of international graduates who chose an academic or research track.

120. Using a unique combination of data from population, employment and educational institution registers, Vasiljeva (2014) evaluated determinants of EU and EEA post-graduate students' decision to stay at least four years in Denmark after the 2004 EU enlargement. She concluded that the *smaller* the nominal wage gap between source and host country, the more inclined students were to stay in Denmark in the medium-run. Students from Southern or Western Europe were also more likely to stay than those from Scandinavian countries. Unemployment and social security differentials between the country of origin and Denmark did not play a significant role in explaining students' staying decisions. Accounting for cultural dimensions, students from countries with a higher acceptance for masculinity dominance [28]displayed a higher preference for staying in Denmark. At the same time, male students from countries with higher acceptance for power inequality were found to be less inclined towards staying – most likely as they perceive that there might be more opportunities for them in their country of origin. In contrast to other authors' findings, Vasiljeva (2014) showed inequality in the home country to be positively related to staying probabilities whilst linguistic similarity exhibited no explanatory power at all[29].

121. Some common findings can be derived from this literature review. The most obvious is that the majority evolved around a discussion of staying behaviour in the US, a very large English-speaking economy with a tertiary education sector attracting many international students. Most European countries have very different labour markets from the US, even ignoring the language factor. Regarding staying patterns of international graduates in the EU, literature provides only determinants for the Netherlands, Norway or Denmark.

122. Nevertheless, there are a number of common determinants of international graduate stay rates. Women tend to be more inclined towards staying in the chosen country of destination. Forming social ties, e.g. marriage, fosters the willingness to stay – so does a longer time spent in the host country. Both factors contribute to a higher attachment to the destination country. The latter leads to a larger degree of

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[28] measured by Hofstede's Masculinity vs. Femininity Index

[29] As the author indicated, this outcome may be driven by the fact that the "language proximity variable mainly accounts for the effect of neighbouring Scandinavian countries which score high on this index" (Vasiljeva, 2014, p. 16).

familiarisation with a country's cultural peculiarities, contributing also to the formation of country-specific human capital, which in turn facilities labour market entry in a host country.

123. International graduates base their decisions whether to stay or to return also on perceived chances: if they assume job opportunities, i.e. skill-specific wages to be relatively higher in the home country, or if the wealth differential between source and host country is not in favour of the host country, they tend to return. But if they expect to run into social or political impediments, lowering their perceived opportunities in a country of origin, they show a preference for staying.

124. Regarding the staying behaviour of doctoral students and scientists, especially the attractiveness of the research environment and the funding source during their post-graduate studies is pivotal: the better and stimulating working conditions were the less willing are those individuals to lose such benefits by turning their back on the destination country.

125. Thus, the central conclusion to be drawn is that international graduates do not decide lightly where they start their career after graduation. Instead, they stay if they consider a destination to be a country of social and economic opportunities, as other types of migrants do as well.

4 WHAT MAKES INTERNATIONAL GRADUATES STAY IN THE EU: INVESTIGATING DETERMINANTS OF INTERNATIONAL STUDENTS' POST-GRADUATION RESIDENCE CHOICES

126. This chapter is dedicated to empirically investigating the staying behaviour of international graduates in the EU member states. The chosen econometric approach aims at providing some answers to the question *what determines international students' stay rates in EU countries?* Above insights into possible mechanisms and determinants are addressed in an empirical framework, using permit based stay rates. Although there are some drawbacks[30], they offer also a huge advantage compared to the tested alternatives: a substantial sample size of bilateral stay rates in 2012, ranging from 783 to 2107 observations.

127. A brief discussion of these statistics' features and related issues will be given in chapter 4.1. Chapter 4.2 lays the foundation for later econometric analysis by highlighting likely mechanisms and introducing components which potentially exert an effect on stay rates. The econometric estimation method will be presented in chapter 4.3. In chapter 4.4 results from the preferred model specifications will be presented and their sensitivity to underlying modelling assumption will be evaluated.

4.1 About the nature of internationally mobile students' stay rates in the EU

128. Internationally mobile students are not an easy subject to study in a cross-country setup. First, as a highly mobile group they are hard to track: Across countries, or even within countries, they are not always registered in a comprehensive manner. In particular after graduation, during the transition from university to working life, they easily disappear from the records.

129. A second issue is the existence of various definitions or recording procedures in different countries. Some compile information on internationally mobile students using the resident concept others rely on the national concept. Additionally, the data may vary regarding the level of aggregation: some countries report only aggregate figures for all incoming students whilst others itemise them by country of origin. Most of the data on internationally mobile students in the EU is stock data which cannot be linked to any individual characteristics. This drawback can be partially remedied by evaluating staying behaviour of individuals included in the European Labour Force Survey (EU-LFS); yet, this too comes at a price.

130. For the purpose of a cross-country assessment of staying behaviour of internationally mobile students in the EU the previously mentioned hitches impose substantial analytical challenges. There is no single perfect statistic identifying post-graduation mobility patterns in this group over all 28 EU member states in a truly comparable and perfectly reliable manner. Instead, the statistic of choice depends on the specific angle of a research question. For instance, the required statistic in an econometric analysis of origin-specific stay rates for all member states should display different features then the statistic used to evaluate labour market outcomes of internationally mobile students, respectively graduates.

131. As integral part of this research, several alternative statistics have been derived and compared in an exploratory study part, found in the extended version of this paper (Weisser, 2015a). Detailed information regarding their construction is provided there and the resulting statistics are contrasted in light of their advantages and limitations. The following subchapter only provides a brief overview of stay rates used for subsequent econometric analysis.

[30] Methodological issues are discussed at length in the extended version of this paper.

4.1.1 Construction of stay rates

132. The three relevant permit based stay rates are: $SR_{ij,t}^{1A}$, $SR_{ij,t}^{1B,h=3}$, and $SR_{ij,t}^{1B,mix}$.While all of them identify those who stayed using permit status changes (from education to another permit category), each was constructed using a different denominator. Stay rate $SR_{ij,t}^{1A}$ derives the population of internationally mobile graduates as the total number of those who relinquish education-related permit status. This population proxy, however, has to be recovered from a demographic equality, based on changes in stock data and new permits since the required figure is not in the data. Several drawbacks are associated: permits for education reasons are not exclusively issued for those enrolled in tertiary education, and for available data the demographic equality does not always allow recovering plausible population proxies for all countries and periods. The latter problem can be circumvented using past inflows, recorded as newly issued education permits in a previous period, to generate a proxy for the population in the denominator and match the respective cohort to present status changers (the stayers). Several time horizons have been evaluated, accordingly to usual durations of a study programme. Most meaningful was a time horizon of three years[31], yielding stay rate $SR_{ij,t}^{1B,h=3}$. To account for varying time horizons of study spells (between one and four years) a mixed cohort approach integrated over cumulative inflows of these periods to recover a proxy for the denominator, resulting in stay rate $SR_{ij,t}^{1B,mix}$.. In addition, all three categories of stay rates were calculated as three year averages over the years 2010 to 2012[32] in order to counteract any random fluctuations, and to attenuate the impact of minor changes in data recording.

4.1.2 Post-graduation stay rates in the EU

133. Depicted conditional stay rates ($SR1A$,Figure 9) highlight that staying behaviour of internationally mobile students varies greatly, depending on their country of origin. For example by far the highest stay rate on the aggregate EU-level is displayed by internationally mobile students from Armenia (79.5%). A high tendency to stay in the EU can also be observed for students from Northern and Western Africa, some South-East Asian countries and the Commonwealth of Independent States. These patterns can be seen as hints towards potential determinants of staying behaviour, such as economic development or historical relations.

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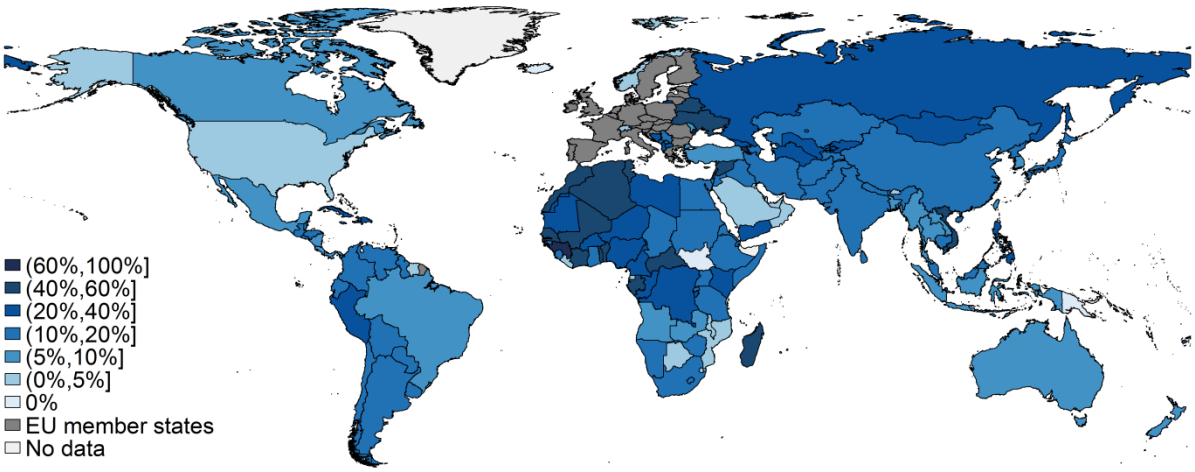
31 corresponding to a three year bachelor programme

32 For the United Kingdom stock data series only contained values from 2012, therefore it had frequently to be excluded from stay rates' analysis.

Figure 9. Conditional average EU stay rates from 2010-2012, by source country

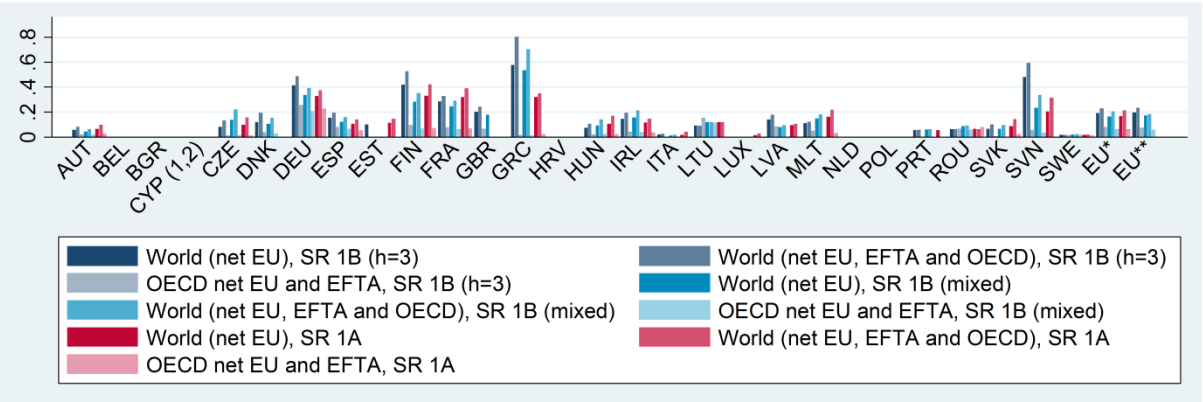


Note: EU refers to 2014 EU members, excluding the United Kingdom. Since these stay rates are based on permits (SR1A), only figures for non-EU countries can be derived.

134. Similarly, destination-specific stay rates across the EU suggest that the retention potential differs significantly between host countries. Figure 10 compares the stay rates in specific EU member states, grouping incoming students into three categories depending on their origin. Stay rates in larger member states tend to be higher, yet some smaller destinations also manage to retain a relatively large share amongst their specific pool of incoming students. At the same time, stay rates of internationally mobile students from other developed countries (OECD net EU) are typically distinctly below those from students originating from third countries (World, net EU, EFTA and OECD).

135. On the aggregate EU-level, across calculation methods, 6.3 to 8.0 percent of incoming students from other OECD countries stayed in the country they studied. Those from third countries were much more likely to stay; corresponding rates are in the range of 20.5 to 23.1 percent.

Figure 10. Comparison of conditional stay rates for international students from various source regions



Source: Based on Eurostat permit data, own calculations

Note: Conditional on the existence of the maximum number of available yearly observations in 2010-2012.
EU* refers to current EU members net the United Kingdom.
EU** refers to all current EU members including the United Kingdom.

4.2 Explaining stay rates: explanatory components and data sources

136. As the previous section has demonstrated, observed bilateral stay rates are highly specific to the examined country pairs, and to a certain extent to the calculation method. The chosen analytical strategy thus accommodates these facts by focusing on country-related features and applying the econometric estimation procedure to all three types of stay rates.

137. The basic idea is to evaluate the impact of various specific features of source country j and destination country i on the respective bilateral stay rate SR_{ij}. Within the analysis of these aggregate pairwise stay rates three different types of influential factors will be considered[33]:

1. Time constant features of host country i (δ_i) which affect students from all non-EU countries during the time horizon in a similar manner, e.g. cultural or climatic aspects of the host country.
2. Specific pairwise time-constant factors (X_{ij}), e.g. sharing a common language or having historical ties.
3. Potentially time-varying factors ($Z_{ij,t}$), such as economic conditions, social aspects or legal frameworks, encompassing composite indicators: Global Competitiveness Index (GCI) and Worldwide Governance Indicators (WGI).

4.3 Estimating determinants: econometric methodology

138. All three types of bilateral stay rates introduced in chapter 4.1 ($SR_{ij,t}^{1A}$, $SR_{ij,t}^{1B,h=3}$, and $SR_{ij,t}^{1B,mix}$) have been incorporated into two different modelling approaches. The first one, based on Papke and Wooldridge (1996) can be applied if one assumes that zero stay rates and positive stay rates originate from a common process, and the analytical focus rests on the stay rates' conditional mean. However, if stay rates are not the result of one single, but two sequential processes, a two-part estimation in the sense of Ramalho et al. (2011) might be appropriate. The first part is a binary zero-one response: either there are no stayers at all or there is some positive number, yielding a non-zero stay rate. The second part consists of a fractional response estimation for those cases with stay rates larger than zero[34].

4.4 Determinants of bilateral stay rates: empirical results

139. Since model selection procedures (see Table A. 6 to Table A. 11) indicated that all other link functions are more frequently rejected than the complementary loglog link function, the subsequent part is dedicated to the discussion of the one- and two-part specifications applying this specific type of link function.

140. Table 6 shows the outcomes for the most preferred specification relying on the Global Competitiveness Index. For all the three stay rates the respective results from the one-part and fractional part of a two-part model are reported. The latter shows results for the subset of non-zero bilateral stay rates, hence it accounts for the possibility that there might be in fact two distinct processes as discussed in chapter 4.3.

141. Due to the construction of stay rates as averages (typically 2010 to 2012), and for the sake of model parsimoniousness, GDP per capita differences, unemployment and competitiveness differences

[33] Further discussion on these components is included in the extended version of this paper.

[34] Derivation of both models is explained in the extended version of this paper.

entered the model as three year averages as well[35]. The 'diaspora effect' incorporates potential network effects with the corresponding variable being the share of migrants[36] from country j living in a destination country i over the total population. This share can be interpreted as proxy for the likelihood of meeting someone from the same country of origin – hence as probability of benefitting from potential diaspora network effects.

142. The implementation of differentials between destination country (DC) and country of origin (OC) was a result of two arguments. First, the degree of precision increased substantially when destination country controls have been introduced (see appendix). This was mainly due to an improved estimation for observations at the lower bound of zero. An immediate consequence is that variables at the destination country level display perfect colinearity with these country controls and thus cannot be used anymore in the cross-section sample.

143. The second consideration refers to the underlying decision-making process of individuals. As previously mentioned, perceived opportunities will most likely govern the process whether to stay or to return on an individual level. If an international graduate arrives at the conclusion that her living standard will probably be higher in the destination country, she would be more inclined towards staying. Such comparisons can be accounted for on the aggregate level by using differences whilst perfect colinearity poses no longer an issue.

144. Testing the model's specification by usage of a generalised goodness of functional form test (GGOFF, Ramalho et al., 2014), suitable to detect symmetric and asymmetric misspecification alike, supported the complementary loglog specification clearly in favour of symmetric ones, i.e. logit or probit. Parallel conducted RESET-tests yielded also results in favour of the complementary loglog fractional modelling approach. Direct model comparisons of one- and two-part specifications, using a P-test (Davidson and MacKinnon, 1981; results not reported), lead to varying preferences depending on the dependent variable and set of explanatory variables. Overall results insinuate a weak preference for the two-part specifications.

145. For all three different stay rates to be investigated, some common results can be derived from the GCI specification: bilateral time-invariant factors play a predominant role. If destination and source country share a common official language the stay rate is between 3.7 and 6.3 percentage points higher for students from such a country of origin. The effect of colonial ties after 1945 is similarly pronounced but less frequently significant. The impact of distance is also non-negligible. If the distance between capitals was to increase by one percent beyond 1000 kilometres[37] observed stay rates decline on average by 0.61 to 0.84 percentage points.

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35 Alternative specifications including lagged differences have been tested. These yielded neither substantial changes in other variables estimated coefficients nor in additional robust insights into the dynamic influence of GDP per capita or unemployment differentials.

36 The stock of migrants is based on the OECD's DIOC database 2010 and has been restricted to those being at least 35 years old. The restriction has been adopted to limit the likelihood that the derived share of migrants includes also internationally mobile students whose numbers are actually an integral part of the stay rate to be explained.

37 Average marginal effects 'dy/ex' have the interpretation of semi-elasticities. Since marginal effects are not constant, but depending on the reference distance, reported results referring to a specific value deliver a more precise picture. Alternative specifications accounted for non-linearities as well. The quadratic distance showed up to be insignificant.

Table 6.Determinants of stay rates – socio-economic and competitiveness differentials

			SR 1A		SR 1B, h=3		SR 1B, mixed	
		marg. effect type	One-part	Two-part (fractional part)	One-part	Two-part (fractional part)	One-part	Two-part (fractional part)
Common official language		dy/dx	0.0402**	0.0373*	0.0547***	0.0535***	0.0635***	0.038
Colonial relationship (after 1945)		dy/dx	0.028	0.039	0.0414**	0.0520**	-0.006	0.004
Distance (between capitals)		dy/ex						
		(at x=1000)	-0.00738***	-0.00613**	-0.00821***	-0.00597***	-0.00844***	-0.004
DC controls			yes	yes	yes	yes	yes	yes
GDP per capita	DC > OC	dy/dx	0.103	0.113	-0.0467*	-0.044	-0.007	-0.013
	OC > DC	dy/dx	-0.042	-0.006	-0.0970***	-0.037	0.012	0.041
Unemployment rate	DC > OC	dy/dx	-0.011	0.000	0.033	0.043	0.009	0.019
	OC > DC	dy/dx	-0.0292*	-0.0412**	-0.0244*	-0.0272*	-0.0554***	-0.0751***
Diaspora effect		dy/ex						
		(at x=0.001)	0.0124***	0.0099**	0.0321***	0.0236***	0.0291***	0.0204**
Global Competitiveness Index (GCI)								
P 1: Institutions	DC > OC	dy/dx	0.0318*	0.0361*	0.0637***	0.0776***	0.0505**	0.0453*
	OC > DC	dy/dx	-0.0633***	-0.0635***	-0.006	0.030	-0.008	0.027
P 2: Infrastructure	DC > OC	dy/dx	0.014	0.016	-0.008	-0.011	-0.021	-0.019
	OC > DC	dy/dx	0.018	0.007	-0.0779***	-0.0823***	-0.0489**	-0.0565*
P 3: Macroeconomic environment	DC > OC	dy/dx	-0.005	0.007	0.009	0.023	-0.010	-0.004
	OC > DC	dy/dx	0.007	0.002	-0.025	-0.032	-0.027	-0.0379*
P 4: Health and primary education	DC > OC	dy/dx	-0.013	-0.012	-0.005	0.001	0.017	0.0512**
	OC > DC	dy/dx	0.061	0.069	0.035	0.021	0.039	0.040
P 5: Higher education and training	DC > OC	dy/dx	0.003	-0.001	0.006	0.005	0.007	0.015
	OC > DC	dy/dx	-0.0644**	-0.0735**	0.002	-0.024	-0.0561***	-0.0711**
P 6: Goods market efficiency	DC > OC	dy/dx	-0.021	-0.028	-0.0313**	-0.022	-0.0278*	-0.019
	OC > DC	dy/dx	-0.025	-0.018	-0.026	-0.060	0.024	-0.008
P 7: Labour market efficiency	DC > OC	dy/dx	-0.010	0.000	0.0246*	0.0370**	-0.012	-0.019
	OC > DC	dy/dx	-0.021	-0.022	-0.007	0.010	-0.0410**	-0.018

P 8: Financial market development	DC > OC	dy/dx	-0.004	0.008	-0.007	0.003	0.000	-0.015
	OC > DC	dy/dx	0.001	0.006	-0.020	-0.002	-0.018	-0.035
P 9: Technological readiness	DC > OC	dy/dx	0.0635***	0.0629**	0.022	0.0409**	0.018	0.010
	OC > DC	dy/dx	0.063	0.053	0.127**	0.127*	-0.040	-0.030
P 10: Market size	DC > OC	dy/dx	0.023	0.0449**	0.020	0.0580***	0.0342*	0.0907***
	OC > DC	dy/dx	-0.0537***	-0.0691***	-0.024	-0.0716***	-0.0373***	-0.0842***
P 11: Business sophistication	DC > OC	dy/dx	0.011	0.019	0.001	-0.006	0.009	0.029
	OC > DC	dy/dx	-0.018	-0.004	-0.018	0.017	-0.027	-0.022
P 12: Innovation	DC > OC	dy/dx	-0.003	-0.003	0.014	0.001	0.033	0.037
	OC > DC	dy/dx	-0.037	-0.0618**	-0.035	-0.0853**	-0.0399**	-0.0563**
Observations			548	458	1,205	855	1,335	928
Residual df			497	407	1152	803	1284	877
Deviance			57.51	42.26	193	115.5	278.8	169.9
Log pseudolikelihood			-151.4	-143.8	-326.4	-287.6	-362	-307.6
AIC			0.7390	0.8510	0.6300	0.7940	0.6190	0.7730

*** p<0.01, ** p<0.05, * p<0.1

Note: Average marginal effects are reported. 'DC>OC' represents a dummy category, indicating that the variables' value is distinctly (significantly) larger in the destination country, and 'OC>DC' vice-versa. Both categories' outcomes refer to the reference group of those observations with no distinct difference between destination and source country. GDP per capita, unemployment rate and GCI pillar score differences entered as three year averages. 'dx/dx' gives the discrete change from the base level (no difference between the two countries). 'dy/ex' gives the change of the dependent variable as reaction to a one percent change of the respective continuous variable x at the given reference point of x. Additional information in the lower segment originates from the estimation of the underlying model with a complementary loglog link function.

146. Economic prospects in an isolated view seem not to matter much on this aggregate level of analysis: Differentials in the average GDP per capita are insignificant in the full specification. They only become significant in the expected way in a reduced model (Table A. 4 to Table A. 6)

147. In light of findings in the literature regarding the impact of unemployment on staying behaviour, a negative relationship between higher unemployment rates in source countries and a lower stay rate in a European destination country is not implausible. Bijward and Wang (2013) provided evidence that some individuals opt to stay in the country with higher unemployment rates. On the other hand, Vasiljeva (2014) identified in her analysis no significant effect of unemployment differentials.

148. An alternative interpretation could be found in the basic concept of the Roy model (Roy, 1951), applied in the context of return migration of foreign-born by Borjas and Bratsberg (1996)[38]. Even where the unemployment rate in the country of origin were relatively higher, it still may be beneficial to return for ability-dependent for a specific subgroup. Some international graduates may face attractive employment

[38] Measures of inequality (including GINI indexes), the income distribution or unemployment rates of tertiary education are not included due to small sample size or insufficient observations.

perspectives in their country of origin even when the general unemployment rate is higher than in the destination country, if for example they offered a scarce and highly valued skill portfolio (e.g. international experience or specific technical knowledge not widely spread in the source country).Regarding aspects of competitiveness, two remarkable facts emerge. First, international graduates seem to display a certain preference for destination countries with more developed institutions: stay rates rise by 3.2 to 7.8 percentage points if the average score differential of the GCI's first pillar is at least one standard deviation above the mean. Second, if a country of origin scores distinctly higher compared to a destination country in the pillar 'innovations', observed stay rates decline by 4 to 8.5 percentage points. Staying behaviour would thus respond to improved innovativeness and a focus on a technological pioneering role in the country of study.

149. There is also an indication that stay rates for students from larger economies (market size) are smaller. Possibly, they expect to have a larger variety of opportunities in their home economy. In a similar fashion, distinctly higher scores in the infrastructure pillar of a country of origin are associated with lower stay rates as well.

150. The following table presents average marginal effects obtained using the governance specifications (WGI). The results are highly consistent with respect to time-constant bilateral components and economic differentials, measured by GDP per capita and unemployment rate differences (Table 7).

151. Furthermore, the diaspora effect seems to be robust across almost all specifications. If the share of migrants from a specific country of origin increases from 0.1 to 0.101 percent[39], observed stay rates tend to be higher by 0.95 to 2.8 percentage points.

152. Average WGI score differentials have been constructed in accordance with the 90 percent confidence intervals from Kaufmann et al. (2010)[40]. The aspect of 'government effectiveness' bears across all types of stay rates and model specifications significant explanatory power: if a destination country scores on average always significantly above a country of origin, stay rates are between 4.8 and 8.7 percentage points higher; if the country of origin performs better in this regard, stay rates are typically 10 to 11.4 percent smaller. All six specifications thus point to the fact that international graduates have a certain preference to settle in the country which has more effective government and better public services.

153. Similarly, if a source country scores on average better in the domain of 'voice and accountability', the average staying likelihood decreases by 13.6 to 16.1 percentage points[41].

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39 Respective shares have a mean of 0.04 percent and a maximum of 10 percent. The chosen reference value of 0.1 percent was already in the highest decile.

40 'DC>OC' indicates that the average score difference for the years 2010 to 2012 was always positive whilst the 90% confidence intervals of both countries' scores were always non-overlapping. This implies that the resulting difference is in fact significant. The reference category for the WGI differential indicator consists of those observations which displayed in at least one year an insignificant score differential. Based on the indicators distribution it can be concluded that country-pairs in the reference group displayed a comparably high degree of similarity in the specific domain.

41 The positive marginal effect for SR 1A highlights the issue associated with much smaller sample size and a reduced set of involved countries.

Table 7.Determinants of stay rates – socio-political and governance differentials

			SR 1A		SR 1B, h=3		SR 1B, mixed	
		marg. effect type	One-part	Two-part (fractional part)	One-part	Two-part (fractional part)	One-part	Two-part (fractional part)
Common official language		dy/dx	0.0516***	0.0533***	0.0582***	0.0716***	0.0726***	0.0725***
Colonial relationship (after 1945)		dy/dx	0.0420**	0.0581**	0.0299*	0.032	0.001	0.010
Distance (between capitals)		dy/ex						
		(at x=1000)	-0.00675**	-0.00687**	-0.00935***	-0.00821***	-0.00822***	-0.00501*
DC controls			yes	yes	yes	yes	yes	yes
GDP per capita	DC > OC	dy/dx	0.101	0.116	-0.012	0.023	0.019	0.035
	OC > DC	dy/dx	-0.038	0.004	-0.0850**	-0.057	-0.023	0.013
Unemployment rate	DC > OC	dy/dx	-0.013	-0.011	0.013	0.015	-0.025	-0.024
	OC > DC	dy/dx	-0.0258**	-0.0364**	-0.0288**	-0.0361**	-0.0477***	-0.0574***
Diaspora effect		dy/ex						
		(at x=0.001)	0.0095**	0.057	0.0278***	0.0168***	0.0178*	0.0069
Worldwide Governance Indicators (WGI)								
Control of Corruption	DC > OC	dy/dx	0.004	0.026	0.006	0.002	0.023	0.007
	OC > DC	dy/dx	0.102	0.182	0.057	0.134	0.043	0.203
Government effectiveness	DC > OC	dy/dx	0.035	0.039	0.0479**	0.0713***	0.0586***	0.0870***
	OC > DC	dy/dx	-0.100***	-0.114***	0.049	0.025	-0.027	-0.051
Political stability and absence of violence / terrorism	DC > OC	dy/dx	-0.006	-0.016	0.0248**	0.019	0.0307***	0.025
	OC > DC	dy/dx	0.164**	0.129	-0.012	0.111	-0.030	0.117
Rule of law	DC > OC	dy/dx	0.029	0.030	0.0478*	0.0747**	0.028	0.044
	OC > DC	dy/dx	0.035	-0.038	-0.020	-0.0870**	-0.062	-0.150***
Regulatory quality	DC > OC	dy/dx	-0.001	0.006	-0.013	0.001	0.000	0.022
	OC > DC	dy/dx	-0.116**	-0.181***	0.119	0.250	0.272**	0.332**
Voice and accountability	DC > OC	dy/dx	0.0671**	0.0820**	0.004	0.000	-0.001	0.027
	OC > DC	dy/dx	-0.072	0.348***	-0.136***	-0.161***	-0.143***	-0.160***
Observations			610	502	1,363	957	1,538	1,045

Residual df	572	465	1322	917	1499	1006
Deviance	68.75	50.12	241.9	151.1	360.9	235.4
Log pseudolikelihood	-171.8	-162.4	-385.2	-339.7	-433.5	-370.7
AIC	0.6880	0.7950	0.6250	0.7940	0.6140	0.7840

*** p<0.01, ** p<0.05, * p<0.1

Note: Average marginal effects are reported. 'dx/dx' gives the discrete change from the base level (no difference between the two countries). 'dy/ex' gives the change of the dependent variable as reaction to a one percent change of the respective continuous variable x at the given reference point of x. Additional information in the lower segment originates from the estimation of the underlying model with a complementary loglog link function. 'DC>OC' represents a dummy category, indicating that the variables' value is distinctly (significantly) larger in the destination country, and 'OC>DC' vice-versa. Both categories' outcomes refer to the reference group of those observations with no distinct difference between destination and source country. GDP per capita, unemployment rate and GCI pillar score differences entered as three year averages.

154. For stay rates derived based on method 1B, the dimensions 'political stability and the absence of violence' as well as 'rule of law' reveal significant correlations with the expected sign. Yet, some marginal effects are larger in magnitude or become significant only in the two-part specification, for instance derived average marginal effects for 'rule of law'. This can be seen as an argument for the existence of two distinct processes governing the likelihood of observing a positive stay rate at all and then the relative size of stayers' population.

155. Taken together, these findings suggest that participation opportunities in general, stability and reliability may influence staying decision.

156. Both modelling approaches, the competitiveness and the governance specification, lead to similar conclusions: Some persistent factors, e.g. historical links or linguistic similarities, are likely to influence staying behaviour heavily. Time-dependent aspects, such as per capita income, referring to wealth level differentials between destination and source country might only be partially relevant. Economic differentials might tip the scales, but are not necessarily major determinants on an aggregate level. Well educated and globally mobile international students are likely to find their niche in most economies.

157. Furthermore, findings on the aggregate level suggest that staying decisions are indeed linked to an assessment of individual opportunities. Those countries seen as more innovative are more attractive to international graduates. Institutional quality and the quality of political processes are plausible determinants of stay rates too. Just like other migrants, international students and graduates opt for a career start in the respective country offering more opportunities whilst providing an institutional environment suitable to sustain these prospects.

5 CONSEQUENCES OF POST-GRADUATION STAYING BEHAVIOUR ON EUROPEAN ECONOMIES

158. Post-graduation mobility decisions of international students, i.e. the choice where they start their careers, clearly have important economic consequences. Aside from the mere question in which country they enter the labour market, their successful integration is relevant too. If their integration into a host country's labour force proves difficult, not only public acceptance of tertiary educated labour migrants might suffer but the economy would incur a loss as well - through a waste of international graduate stayers' potential and skills.

159. Aside from labour market related consequences, staying behaviour of international graduates has implications with respect to fiscal policy too. There might be plausible arguments linking the costs of providing education to international students and their post-graduation migration patterns. Beyond this, the ramifications of changing stay rates on other policy domains should be considered as well.

5.1 Labour market related consequences

160. The integration of international graduate stayers into the labour market will be evaluated based on descriptive statistics, derived from the EU-LFS. Available data, for most of the presented statistics, allows a distinction between EU and third country national stayers. This entails the opportunity to evaluate the degree of substitutability between these two distinct types of stayers.

161. This empirical examination is followed by a brief discussion of possible consequences of a shift in the tertiary educated labour supply, induced by an increasing stay rate of international students and graduates.

5.1.1 Labour market outcomes of stayers - LFS

162. Regarding labour market integration and outcomes of international student stayers[42] the EU-LFS provides valuable insights. A direct comparison of stayers to their native peers (domestic graduate stayers), which graduated in the same year, allows a more in-depth analysis of employment outcomes in general but also with respect to sectorial differences or other distinguishing characteristics.

163. International graduates are just as successful regarding their labour market entrance as domestic graduates: one year after graduation there is no significant difference between the employment status of domestic graduate stayers and international graduate stayers[43].

164. International graduate stayers (10.9%) do not face larger risks of being unemployed than their domestic peers (11.6 %). However, one should bear in mind that these international stayers might be positively selected, with skills in high demand, whilst international graduates who failed to find a job or who saw dim employment prospects already left the country.

165. International graduate stayers have a higher likelihood of receiving part-time contracts. This result is to a large extent driven by stayers from third countries, especially female graduates. There emerges also a noticeable difference regarding income deciles: international stayers have a slightly lower probability of reaching the two highest deciles and a higher probability of being in the lowest two deciles. The observed differences are not however significant at conventional levels.

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42 Stayers are identified following the concept SR3, illustrated shortly in chapter 4.1.

43 The large share of inactive individuals is for EU graduate stayers, and especially for domestic graduates, mainly driven by those who are studying on or who are in further training after their first degree.

Table 8.Labour market outcomes and characteristics by type of stayer, 2012

Outcome		domestic graduate stayers	all internat. stayers		EU graduate stayers		3rd country stayers	
		%	%	$P(z > \chi^2)$	%	$P(z > \chi^2)$	%	$P(z > \chi^2)$
Age	15-19	1.55	0		0		0	
	20-24	45.44	27.87		32.64		21.54	
	25-29	38.32	42.86	0.0000 ***	38.32	0.0020 ***	44.81	0.0000 ***
	30-34	9.92	26.8		23.56		28.19	
	35-39	4.77	5.46		5.48		5.46	
Sex	Female	57.02	57.74	0.8623	69.96	0.0084 ***	52.51	0.3959
	male	42.98	42.26		30.04		47.49	
Marital status	Married	11.52	26.93		20.78[b]		29.56	
	Single	87.83	70.13	0.0000 ***	74.00[b]	0.0009 ***	68.47	0.0000 ***
	Widowed, divorced, leg. separated	0.65	2.94		5.22[b]		1.97	
ILO labour status	Employed	62.45	65.5		71.8[b]		62.81	
	Unemployed	11.64	10.94	0.6885	8.87[b]	0.1757	11.82	0.9905
	Inactive	25.91	23.56		19.34[b]		25.37	
Professional status	Self-employed	6.19	7.71		15.54[b]		3.88	
	Employee	93.11	92.12	0.3887	84.64[b]	0.0248 **	95.86	0.2171
	Family worker	0.7	0.18		0[b]		0.26	
Full-time / part-time distinction	Full-time	77.1	65.51	0.0093 ***	75.99[b]	0.8425	60.39	0.0053 ***
	Part-time	22.9	34.49		24.01[b]		39.61	
Permanency of job	Permanent job	55.16	65.63	0.0482 **	[a]		62.53	0.2965
	Temporary job	44.84	34.37		[a]		37.47	
Monthly labour income	in deciles 1 and 2	20.36	22.69		[a]		21.15[b]	
	in deciles 3 to 5	31.73	22.99	0.2447	[a]		18.08[b]	0.1614
	in deciles 6 to 8	34.22	43.51		[a]		48.87[b]	
	in deciles 9 and 10	13.68	10.81		[a]		11.9[b]	
Job adequacy	High skilled	70.43	59.06	0.0000	65.98[b]	0.5201	55.68	0.0000

	Medium skilled	27.7	31.87	***	30.62[b]		32.49	***
	Low skilled	1.86	9.07		3.4[b]		11.84	
Field of highest educational attainment	Teacher training and education science	9.4	5.2		2.71[b]		6.41	
	Humanities, languages and arts	9.91	16.2		22.19[b]		13.3	
	Social sciences, business and law	34.83	36.51		32.41[b]		38.49	
	Science, mathematics and computing	11.13	12.92	0.1583	14.63[b]	0.0027 ***	12.09	0.6370
	Engineering, manufacturing and construction	14.73	15.15		11.72[b]		16.8	
	Agriculture and veterinary	1.77	0.26		0.12[b]		0.32	
	Health and welfare	13.38	10.23		10.71[b]		9.99	
	Services	4.86	3.55		5.5[b]		2.6	
Locational choice (urbanisation)	Densely populated area	53.02	81.03		82.05[b]		80.6	
	Intermediate area	26.23	10.42	0.0000 ***	10.93[b]	0.0000 ***	10.2	0.0017 ***
	Thinly populated area	20.75	8.55		7.02[b]		9.2	
Firm size	1-10	17.07	23.37		[a]		25.6[b]	
	11-19	11.93	7.92		[a]		7.89[b]	
	20-49	17.29	16.52	0.3944	[a]		20.15[b]	0.3673
	50 and more	53.71	52.19		[a]		46.36[b]	

Source: EU-LFS, own calculations

Note: Percentages within the respective weighted subgroups are reported. P-values result from a design-based Chi squared test. If a p-value is smaller or equal to 0.10, the proportions of a respective international stayer group are assumed to be significantly different from the reference group of domestic stayers (*** p<0.01, ** p<0.05, * p<0.1).

[a] weighted group sum is in 2012 below reliability threshold A (20000), thus not reported.
[b] weighted group sum is in 2012 above reliability threshold A (20000) but below reliability threshold B (40000).

166. Accounting for job adequacy, indicated by occupational skill level, international graduates display a significantly higher likelihood of being employed in an occupation which requires only medium or low skills. Whereas only 1.9 % of domestic stayers find themselves in a low-skill occupation, the share of third country graduate stayers is 11.8 %.

167. Conditioning on the field of their university degree, EU graduate stayers differ significantly from their domestic counterparts too. They engaged significantly less likely in teacher training and education science (as seen in the general enrolment preferences) or in the field of social sciences, business and law. On the other hand, they graduated more often in the humanities, languages and arts.

168. The preferred locational choice of international graduate stayers deviates clearly from domestic stayers' preferences. Third country graduate stayers, and even more so EU graduate stayers, prefer densely populated areas over intermediate or more rural ones.

169. Overall, international graduate stayers perform comparably well regarding the integration into a country's labour force. But as this brief analysis indicates, graduate stayers preferences and national or regional labour market needs do not necessarily coincide. International graduate stayers seem little inclined to reside outside of metropolitan areas, nor do they currently show signs of more pronounced preferences for a career in STEM fields (science, mathematics and computing or engineering, manufacturing and construction) or the area of health and welfare.

5.1.2 On the nexus of stay rates and skilled labour supply shifts

170. The question regarding a likely impact of a supply shift of tertiary educated labour on labour market outcomes for involved groups is an ample field of research in itself. This paragraph thus can neither provide a comprehensive overview over the state of current research nor can it present detailed empirical results. It serves merely to spotlight three relevant aspects in the nexus of international graduates' staying behaviour and labour market outcomes: permanence of supply shifts, the impact on wage levels and employment, and the unemployment of younger cohorts of tertiary educated labour.

171. Every international graduate who decides to stay in the country of graduation (or the EU) contributes to a marginal supply shift of tertiary educated labour. Abstracting from all other effects of such a supply shift, there still remains the question concerning the aspect of permanence: is an international graduate's decision to stay final or only part of a qualification process which increases human capital further before returning?

172. Literature provides some direct information regarding staying behaviour of internationally mobile graduates in a more dynamic context. For instance Finn (2012) reported for foreign PhD-holders in the USA five year stay rates which declined by eight percentage points on average compared to short-term rates. This decrease holds also for graduates in computer sciences and engineering, and it is even more pronounced for physical science and mathematics.

173. Similarly, figures presented by Van Bouwel (2010) pointed to a decrease of five to eight percentage points, depending on the source region of European PhD-holders graduating in the USA. For Denmark, Ministeriet for Forskning (2013) showed stay rates of international students three years after graduation to be six percentage points lower than after the first year.

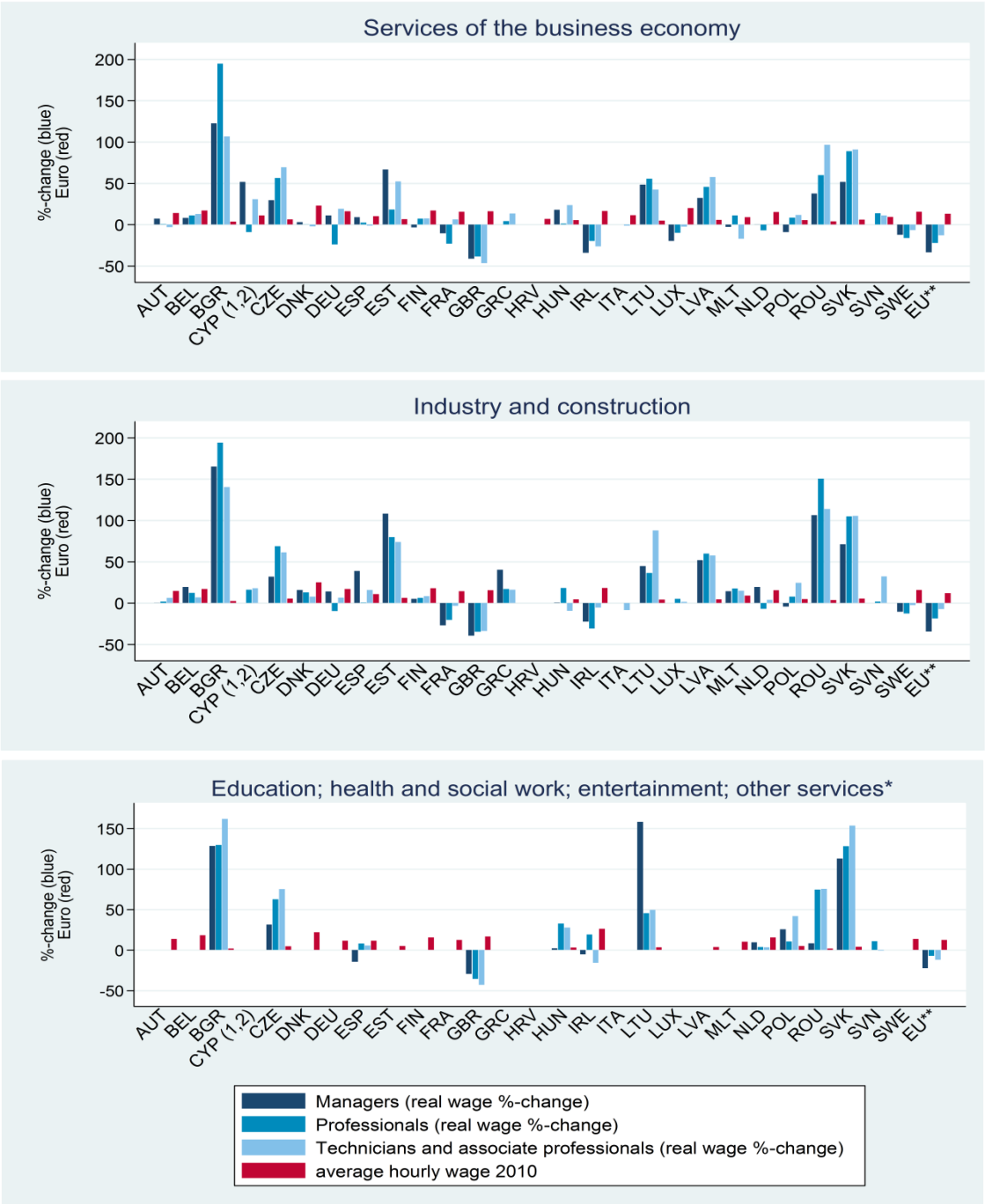
174. Unsurprisingly, staying behaviour of internationally mobile students might only be temporary. Whilst some came initially to stay for good, others aimed at gathering some working experience and collect then the additional skill premium in a different labour market. As the previous chapter indicated, short-run stayers are likely to be positively selected, this might also hold true for sequential staying decisions in the medium- or long-run.

175. Nevertheless, the cohort of those who chose to stay at first will shrink over time, even in the so-called STEM-fields which are typically mentioned in the context of alleged skill-shortages. If international graduates are sought to alleviate the impact of this kind of stated friction, it has to be kept in mind that only a fraction will be there to fulfil this role in the long-run. They are highly-skilled and have already proven to be highly mobile as well, so in the end, some of them will only be temporary migrants and not permanently provide their talent to the EU.

176. Turning to the second aspect, namely the connection between changing staying patterns and wages, one could try to infer whether status quo and recent wage trends might be conducive to a desired

expansion of tertiary educated labour supply. Although purely monetary motives are not necessarily pivotal regarding staying decisions of international graduates, comparably higher wages at career start after graduation might nevertheless increase someone's inclination towards staying. On an aggregate level, this could then result in a broadening of tertiary educated labour supply.

Figure 11. Changes of average hourly real wages for high-skilled young professional



Source: Structure of earnings survey and HICP (Eurostat), own calculations

Note: * the category's complete label is 'Education; human health and social work activities; arts, entertainment and recreation; other service activities'

EU** refers to all 28 current EU members Average real wage changes have been derived as change of average hourly wages between 2002 and 2010 net consumer price changes, the latter taken from the HICP series (Harmonised Indices of Consumer Prices). High-skilled workers are identified based on the ISCO-08 classification.

177. Figure 11 depicts the changes between 2002 and 2010 in hourly average real wages of high-skilled employees for three different sectorial aggregates. The sample has been restricted to those below 30 years of age to represent the entry ages after university graduation.

178. In almost all EU member states which acceded in the 2004 enlargement, average real wages surged. This can be attributed to a large extent to a catching-up process, since in 2010 the average hourly wages are still clearly below the wages in the old EU member states.

179. Most of the older EU member states experienced moderate real wage increases for young professionals. However, some of them welcomed high-skilled labour market entrants with decreasing real wages, with the United Kingdom leading the way. Here, "each cohort of graduates since the financial crisis is earning less than the one before". "New graduates who earned £15,000 or more in 2011-12 – enough to start repaying their loans – were paid on average 12 per cent less in real terms than graduates at the same stage of their careers in 2007-08" (Financial Times, 2013).

180. For the EU as a whole, the picture looks similar: across all high-skilled occupations, real wages declined between 2002 and 2010 by 6.9 to 34.3 percent. This is not exclusively a result to the financial crisis: between 2002 and 2006 young professionals employed in the field of 'Education; human health and social work activities; arts, entertainment and recreation; other service activities' benefitted from a real average wage growth of 4.4 percent – while young high-skilled workers in the remaining eight groups experienced a decline of average real wages of 1.5 to 17.4 percent.

181. Real wage developments for young high-skilled professionals in the EU 15 raise doubt on the existence of a general labour shortage concerning high-skilled employees. Beyond, partly declining average real wages for this group will neither increase enrolment in tertiary education in general, nor improve the EU's retention capability with respect to international graduates. Instead, this adverse development suggests a relatively weaker demand for tertiary educated or high-skilled labour at an early career stage in the EU in the period examined.

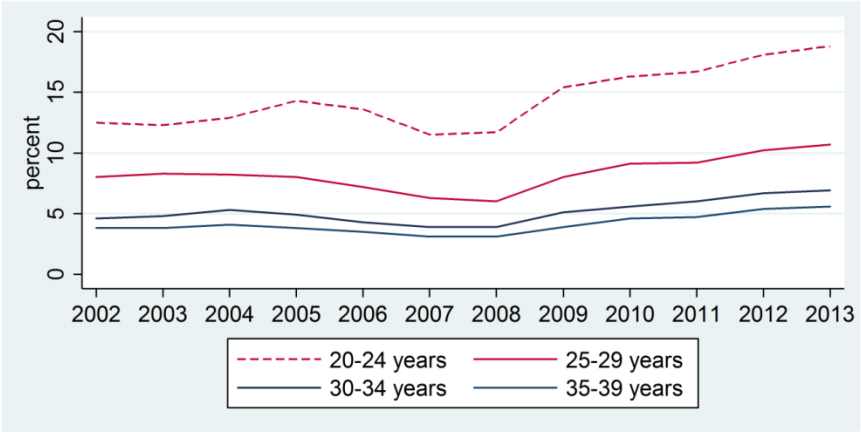
182. The third aspect to be briefly highlighted are employment perspectives for internationally mobile graduates with respect to their risk of being unemployed. As previously shown, those who stayed upon graduation have almost identical unemployment rates than their domestic peers. This suggests that the sample of stayers is affected by a country's general labour market conditions in a similar manner as nationals. These general conditions have worsened from 2008 onwards on a broad scale. In most of the EU countries, tertiary educated (ISCED 5 and 6) individuals below age 40 faced in 2013 a much higher likelihood of being unemployed than they did five years ago (see Figure 12).

183. This adverse labour market environment was especially harsh for the age cohorts 20 to 24 and 25 to 29 years, which is the typical age at which someone graduates from university. The unemployment rate of the youngest graduates reached 18.8 percent in 2013, for those aged 25 to 29 it was at 10.7 percent still the highest value since this series has been introduced. This general trend is also mirrored in some anecdotal evidence, highlighting that even a costly university education is no longer a guarantee for a smooth labour market entry: the top 100 employers in the UK offered in 2014 nine percent fewer graduate vacancies than before the crisis (Financial Times, 2013).

184. Under the currently prevailing circumstances in most EU countries, higher stay rates or especially higher absolute numbers of stayers would most likely not contribute to improving the labour market situation for tertiary educated entrants. This is also true in light of the fact that stayers' fields of graduation are not significantly different from those of their domestic peers - hence they offer a similar portfolio of qualification and skills. Taking recent years' unemployment trends and the similarity of

international and domestic graduates into account, any first-glance impression of those two types of graduates being substitutes cannot be easily dismissed. If international graduates are supposed to strengthen the economic position of EU member states by providing their skills and talents, the general environment which enables them to do so should be improved.

Figure 12. EU 28 unemployment rates for tertiary educated, by age



Source: Eurostat, EU-LFS data

185. What are the general conclusion regarding the nexus of staying behaviour of international graduates and skilled labour supply shifts? Current labour market conditions, thus unemployment rates and remuneration trends, indicate relatively poor conditions for labour market entrants after graduation on the aggregate EU level. With some exceptions, international graduates are now facing in most EU countries less favourable labour market conditions than five to ten years ago. This in turn might translate into lower stay rates in the short- or medium term as highly-skilled and internationally mobile graduates attribute a dwindling attractiveness to the EU labour markets.

186. In addition, graduate stayers' initial study preferences are similar to those of domestic students. Hence it is rather unlikely that higher numbers of stayers translate immediately into substantially higher numbers of qualified job applicants in STEM occupations, especially in non-metropolitan areas. The underlying issue, a mismatch between applicants' study or location preferences and employers' demands, cannot be eradicated by unselective retention of international graduates.

5.2 General fiscal and demand-related implications of graduates' staying behaviour

187. Labour market outcomes of international graduate stayers have shown that stayers display an employment rate at least as high as the native comparison group. Such high shares regarding stayers' participation indicate that they constitute a relevant part of the highly skilled labour force.

188. If, furthermore, a host country has a high demand for tertiary educated labour, which cannot be satisfied by domestic supply, international graduate stayers' labour supply will be complementary. Hence, any additional graduate stayer would marginally contribute to an expansion of the host country's output - and as employee to an increasing income tax base alike.

189. Moreover, these stayers display an unemployment rate similar to domestic graduates or below, hence they typically do not pose a burden to social security systems: amongst those graduates who one year after graduation are unemployed or inactive, 5.4 percent of domestic graduates and 5.1 percent of all international graduate stayers receive benefits or assistance. Restricting the sample to third country

nationals who stay, 97.1 percent of unemployed or inactive stayers do not receive any social benefits or assistance whilst the same holds true for only 94.6 percent of domestic graduates. The design of social security benefits or assistance, most likely eligibility criteria, and the high employment rate of international stayers ensure that international stayers are from a relative point of view a lesser burden to EU social systems than domestic graduates.

190. International graduate stayers who are unemployed or inactive do still consume in the chosen country of residence, thus they contribute to the demand for commodity goods. This plausibly results in a marginal contribution to the respective country's GDP. At the same time, by means of value added commodity good and service taxation, they further contribute to municipal or governmental revenues.

191. If one extends the time horizon to comprise also periods prospective international graduates are still enrolled at university, the consumption argument holds of course already during studies. Vossensteyn et al. (2013) quote for example a weekly consumption level of 500 Australian Dollar for international students in Australia. They also report that international students in Canada spent in 2010 more than 7.7 billion Dollars for tuition fees, accommodation and discretionary spending. NAFSA (2013) provides figures regarding the economic relevance of international students in the US: international students and their dependents contributed in the academic year 2012/2013 approximately 24 billion US-$ to the US economy and supported 313,000 jobs. For the UK, international students' contribution to the economy is assumed to be in the range of 12.5 billion British Pound. Over and above, "for every ten international students, three full time equivalent jobs are created in the UK" (House of Commons, 2011, p. 8).

192. Taken these facts together, the average graduate stayer can be expected to become already in the short-run not only a consumer, adding to internal demand, but also a fiscal net-contributor.

5.3 Funding of higher education and internationally mobile students

193. Before international stayers can contribute to a host country's economic prosperity after graduation, they already constitute a part of the overall demand for tertiary education. For a couple of countries, this fraction amounts to more than ten percent of total enrolment (see Table A. 2). This has further fiscal implications regarding the funding of higher education.

194. Some countries, for instance the UK, charge higher tuition fees from non-EU students. Others, aside from administrative fees, provide access to higher education for all students free of tuition fees. The first group of countries not only manages to recover marginal costs of providing tertiary education to a third country student but also to lessen fiscal restrictions regarding the funding of higher education institutions in general. In fact, this might even result in a successful sort of cross-subsidising tertiary education for domestic students[44] by attracting international students (Findlay, 2011, p. 178). In the absence of capacity constraints, any additional international student generates an immediate fiscal gain.

195. This outcome is partially efficient since those who benefit personally from a high quality education system also shoulder associated costs. On the other hand it might be partially inefficient as well: if international fee paying students decide to stay upon graduation, then the host country would benefit from a privately funded human capital investment. This kind of positive externality might imply an

[44] The claim that this is a non-negligible case of cross-subsidising is supported by figures from the academic year 2005/2006. According to House of Lords (2008, p. 512), non-EU domiciled students paid fees of approximately GBP 1.5 billion, which amounted to 8% of the higher education sector's total funding in the UK.

initially too low private investment in education, and the higher the stay rate, the larger the overall impact of this externality might become.

196. For the second group of countries, the immediate net effect is not as unambiguous. Accounting only for the purely fiscal aspect of funding tertiary education in a short-run, any additional international student will lead to a marginal increase of public expenditure. Thus, from a merely fiscal point, if consumption levels of international students were low, e.g. due to individual financial constraints, and they had complete access to all public services, the governmental budget might incur a net loss due to an international student. This however can change in the medium- to long-run, mainly depending on whether international students stay after graduation and successfully integrate themselves into the labour force or not. Here, the post-graduation stay rates are of key interest.

197. Referring to previous considerations with respect to fiscal or economic net contributions after graduation, the higher the stay rate, the faster or more likely previous public expenditures can be recovered. Both cases, referring to the extremes of the basic funding alternatives (private versus public), lead to the conclusion that an optimal fiscal policy should neither focus exclusively on minimising fiscal burden of providing tertiary education to international students nor on maximising subsequently generated additional (income) tax revenues.

198. In the presence of highly mobile international graduates, the overall fiscal outcome would not only be determined by education policy competition but also by tax competition between host countries. In this context, Krieger and Lange (2010) discuss in a fiscal competition model the impact of student and labour mobility. They model the mechanisms of interconnected student and graduate mobility on the one side and education expenditures and tax rates on the other. Amongst other findings, they establish a relationship between international graduates' tax sensitivity and decreasing overall net revenues. This effect is mainly driven by a comparative cost advantage when it comes to migration, which allows international graduates to leave high taxation countries more easily. This tax base erosion can only partially be offset by lowering education expenditure or increasing fees.

199. In an alternative modelling approach Lange (2013) aims at explaining the impact of changing stay rates on optimal tuition fees if some net gains already accrue to the host country during international students' study period. This was for example the case if costs of tertiary education in relation to students' consumption levels were sufficiently low. If international students correctly anticipate, at the time of their initial study choice, a low post-graduation staying probability, their demand for tertiary education abroad reacts more sensitively to changes in tuition fees. If international students generate public net gains already during studies, lowering tuition fees in case of declining stay rates would be the optimal policy.

200. The outcome changes however, if international students had irrational, i.e. overly optimistic expectations regarding the possibility to stay. If they assume to be able to reap the benefits from a high quality education and favourable labour market outcomes in the host country in any case, their demand for foreign education is less elastic with respect to tuition fees. Here, rising tuition fees and simultaneously declining stay rates might still increase governments' net revenues. Both approaches provide strong arguments in favour of a high importance of international students' choice sensitivity regarding host countries tuition fees and expectations regarding post-graduation opportunities.

201. Poutvaara (2008) incorporated the fact that tertiary education may not be equally transferable across countries: for example degrees in law may have a rather national relevance, whereas degrees in natural sciences should be applicable in an international context – principles of quantum physics do not change depending on which side of a border they have been taught, yet paragraphs in fiscal law are likely to differ. He established that the national public provision of internationally applicable education, yielding positive externalities for other countries as well (due to graduate mobility, fostered e.g. by mobility

programmes), could remain strictly below a global optimum. A possible suggested solution was the introduction of a graduate tax, accruing to the country where a possibly mobile graduate acquired her university degree.

202. A further extension was investigated by Delpierre and Verheyden (2014) who addressed also quality of provided education and location preferences of graduates. Optimal funding schemes could change in the presence of potentially conflicting priorities of universities and governments. Universities might engage in competition for (international) students, by raising quality, whilst governments aimed at maximising an economy's output under fiscal competition. Some resulting inefficiencies, e.g. underinvestment in human capital if workers are mobile, could be remedied by transnational transfers for mobile students.

203. Theoretical models' mechanisms and previously presented empirical evidence underscore the economic relevance of international students for a host country. Yet, when it comes to defining policy measures regarding international students' enrolment, all associated decisions will be made between conflicting priorities of fiscal goals, revenue or output maximising aspects in the short- and long-run, socio-political necessities and other policy fields.

204. The complexity of determining an optimal policy (mix) can be easily demonstrated: Higher tuition fees for international students might relax short-run fiscal constraints at the cost of lower enrolment numbers if students' demand for foreign education is price sensitive. But this in turn might hamper the generation of future revenues or economic output, by negatively affecting the overall number of prospective stayers

205. Low tuition fees in contrast could be a suitable policy to attract in a first step brains to fuel the knowledge economy. If post-graduation stay rates were at the same time low, this might indicate a certain degree of free-riding. Yet, if the policy goal was to export higher education - jointly with low or no tuition fees at all, this could be seen as part of a host country's development assistance - low stay rates for international students from developing countries would then indicate a rather successful outcome. As it happens, achieving this latter goal seems difficult, as there is evidence that even setting quotas, and defining scholarship schemes to foster return to developing countries often fail their purpose (Brekke, 2006; Hein and Plesch, 2008).

206. This chapter prompts the conclusion that any measure directly or indirectly targeting international students' stay rates should only be implemented after having clearly defined a country's policy priorities. Increasing stay rates by all means may produce the desired advantageous result in one policy domain, but at the same time come at the price of impairment in another field.

6 POLICY RECOMMENDATIONS

207. Empirical results from this study, as well as established findings in the migration literature may now serve as point of reference for the derivation of policy recommendations. Presented suggestions concern two major questions: how to increase the number of stayers - thus stimulate associated positive economic outcomes, and which measures to promote for a reliable investigation of future dynamics?

208. Answers to the first question address directly the goal of turning international students' potential and skills into real gains for the EU in the medium and long-run and these answers might have immediate practical implications. Here, the ever present underlying assumption is that higher stay rates translate into real socio-economic net gains. The second question is more a technical one, but nevertheless an important aspect if internationally mobile students' staying behaviour or the effectiveness of intertwined policies shall be evaluated more precisely.

6.1 Measures to foster international students' attachment to the European host country

209. Although some plausible determinants of stay rates have been identified, not all empirical findings may be translated into tangible policy measures: for instance, it is just not possible to reduce geographical distance between a country of origin and a destination country. Nevertheless, there might be some policies which have the potential to strengthen the EU's retention capabilities by increasing countries' or individuals' 'proximity' in other domains, e.g. in the sense of reducing barriers to integration and by lowering associated costs.

210. The overarching goal has to be to foster international students' attachment to EU host countries and to facilitate integration in general as well as into the labour market in particular. As the main leverage points for retaining talents in the EU have been identified the following aspects:

1. <u>Group specific recruitment</u>

   International students from some countries of origin display a higher inclination towards staying in the EU than others. Furthermore, focusing on undergraduate international students implies that these students have more time to get familiar with a host country's culture, language and administrative procedures. This in turn reduces the effective (and perceived) obstacles for staying after graduation.

   Recruiting and educating more of these likely stayers would then subsequently translate into higher numbers of stayers.

2. <u>Granting funding for advanced studies</u>

   Scholarship programmes' negative monetary incentives, i.e. to induce return after graduation, appear to be ineffective. The other way round, providing funding to doctoral students and offering them the opportunity to become more familiar with host country specific research fields strengthens their attachment to the host country and reduces financial insecurity. Funding schemes could be concentrated in those areas which are perceived to suffer from a certain 'brain' shortage. This might be achievable within the framework of the Marie Skłodowska-Curie actions and explicitly address international students at the end of their masters' programme, just when they decide whether to stay or to return. Most importantly, funding opportunities have to be made publicly known in the designated target group.

3. <u>Language courses</u>

   Even if more and more study programmes are taught in English, most EU countries' business and daily life language is not English. Offering more intensive high-quality language courses and setting incentives for participation during studies will reduce actual or perceived comparative disadvantages regarding employment. As taking additional courses implies higher workload, an integration of these

courses into the ECTS system deems advisable. As such courses foster social inclusion, tapping the European Social Fund to support high-quality language courses at universities or for university students could be a feasible solution.

4. Labour market policies

As the analysis of labour market outcomes has shown, there are some dimensions where international graduate stayers find themselves in a less favourable situation: they tend to be more often in part-time and less adequate employment, considering their educational attainment. Here, providing additional support, e.g. by financing seminars specifically designed for introducing international students to national peculiarities of an application process, might improve their integration into the labour market.

Moreover, all essential information from employment agencies should be available not solely in the national language, but at least in English or other major languages. This would facilitate the understanding of administrative procedures and job search itself.

From a general point of view, there remain also some policy issues on the macro level: although international graduate stayers are willing and able to integrate themselves into a host country's labour market, their willingness to stay is certainly depending on the specific labour market situation. Current labour market conditions in some larger EU countries signal however a certain degree of saturation regarding tertiary educated labour. If more international graduates are to be kept in order to cope with future demographic trends, these underlying adverse labour market conditions for young professionals should be addressed first.

5. Political stability and participation

Empirical findings indicate that stay rates are higher in politically stable countries and those where the possibility for political participation is more pronounced. Whilst the first aspect can be seen as guaranteed in any EU member state, more participation opportunities for third country nationals might improve their inclination towards staying: if a foreign national contributes to a country's economic and social success he or she should also be given a voice. In this regard, a harmonization of EU nationals' and third country nationals' rights would represent a credible commitment.

6. Institutional design and governance

Properly working institutions, which handle administrative procedures not only transparently but also promptly, are important. For instance, if the processing of visa takes too long, an international graduate who would have otherwise found skill-adequate employment in the host country might take up a job offer in the country of origin. Furthermore, administrative processes should be designed in such a way that they can be understood and appropriately prepared by someone who is not familiar with country-specific administrative hurdles.

7. Innovative and competitive environment

Keeping the brightest requires being able to offer them an interesting and challenging working or living environment. This holds especially true when it comes to graduates in the technical or engineering field, and especially for researchers - keeping their ideas means providing them with an opportunity to realise these ideas. This in turn strengthens the importance of preserving or even increasing technological competitiveness: private and public R&D expenditures have to mirror such an aspiration. Furthermore, a research and innovation friendly environment – in a political and social dimension alike – is important as well.

211. Potential graduate stayers have probably gained some experience with respect to the performance of a host country in some of the above mentioned domains. Being well educated, highly mobile and possibly also being a sought employee abroad, they will base their decision to stay to a large extent on whether a respective EU member state meets their expectations or not. In the end it is not about

announcing a welcoming culture but about adopting concrete measures which actually translate into a working and living environment offering real opportunities for those we want to stay.

6.2 Monitoring international graduates' residential choices

212. Previous chapters' elaborations adverted briefly to some drawbacks regarding the various methods to assess international graduates' staying behaviour. Aside from general reliability issues, insufficient data coverage and harmonization have been identified as additional limitations in the extended version of this paper. Furthermore, all investigated calculation methods can only provide information with respect to short-term staying behaviour.

213. Especially the latter deserves some additional considerations as such short-term outcomes might be poor predictors for medium- or long-term staying behaviour: if studying abroad and starting the career abroad is only seen as one way to increase human capital, e.g. by acquiring international experience, the return to a country of origin might have been always part of an individual career plan (Perkins and Neumayer, 2013; Findlay et al., 2012). Consequently, short-term stay rates in EU countries might be high whilst long-term rates could be very low. This implies that those who have been educated in an EU country, gathered country-specific human capital and first practical working experience were afterwards likely to leave – probably exactly at a point where they reached a high productivity level.

214. Hence, for the EU to benefit from international graduates' in an extensive way, the goal should not be to concentrate exclusively on short-term staying behaviour, but to ensure that the EU remains attractive for these individuals for a longer period. Yet, to evaluate whether the EU achieves this objective, reliable medium- and long-term stay rates have to be derived. At the present state it is infeasible to obtain such measures on the scale of the EU due to a lack of adequate data. In the following, two possible approaches to resolve this issue are briefly sketched.

1. <u>Augmenting EU-LFS</u>

   The basic issue regarding the identification of stayers in the LFS is related to the country of university graduation. Currently, it can only be inferred one year after graduation via country of residence at the graduation year – this implies directly its short-term nature. If the basic set of items regarding highest education attained (level, field and year) was supplemented by 'region of graduation', international graduates would be easier to identify and trace over time. This basic adjustment would remove all doubts regarding the identification of stayers amongst the set of internationally mobile students.

   Although such a modification would constitute a significant improvement, only a partial picture of international graduates' mobility could be derived, namely cohort-specific stay rates for l and $l-1$ years after graduation. Additional elicitation of the region of work or residence in the year after graduation would further allow determining a cohorts' short-run stay rate, even if some time has elapsed between graduation and respective survey year.

   Two remarks remain: First, the larger l the fewer stayers can be expected. This might conflict with reliability thresholds once again. Second, this simple modification would not enable any inference regarding mobility or migratory events after the first year after graduation and before year $l-1$. Nevertheless it constituted a substantial improvement regarding capturing more facets of dynamic staying behaviour in the EU-LFS.

2. <u>Harmonized graduate survey on the national level</u>

   To avoid the underlying pitfalls related to usage of EU-LFS data, a graduate survey could be suitable to derive short- and medium-run stay rates. Since a survey targeting potentially highly mobile individuals suffers probably from high non-response, likely to increase over time, and small sample size, a special procedure is proposed: implementation as an event history calendar for international

graduates from nationally representative universities. The so-called event history calendar (Sage et al., 2013) can be set up as an online-based tool which asks participants to report status changes. These changes may cover changes of employment status, residence change but also cover other topics of interest, which allows then an analysis with respect to determinants of staying (or returning) behaviour on the subject level. Such an approach would in fact account for detailed mobility-related experiences in a medium-term time horizon, for example three to five years.

Participants, however, should be offered some incentive to report changes constantly and to avoid increasing non-response levels. This necessity implies that a restriction to a subset of universities was unavoidable. These participating universities should host an international student body of substantial size whilst offering a wide range of programmes and fields of study. A positive and required by-product of involving specific universities is that university-specific numbers of international graduates, possibly even by field and sex, could be obtained concurrently.

Whilst the first approach would be easier to implement, as it does not involve the development of a specific tool on the European level, the second was suitable to deliver more detailed insights into sub-groups' staying behaviour. Furthermore, detailed determinants of international graduates' mobility could be investigated as well.

Both approaches would constitute a significant improvement to the current state regarding the examination of dynamic staying behaviour of international students and graduates. If we want to understand what makes them stay in a longer perspective, we need a reliable and transnationally comparable data source.

7 SUMMARY

215. This report investigated the preferences of internationally mobile students with a special focus on post-graduation mobility. The key findings emerging during this research project, as well as the main implications will be briefly summarised below.

216. Some stylised facts on the distribution of internationally mobile students in the EU:

- With almost 1.5 million international students enrolled in 2012, the 28 EU countries constitute still the most attractive destination area for studying abroad - 38 percent of all internationally mobile students chose the EU in 2012. However, Asian destination countries are becoming increasingly more popular.
- Approximately two thirds of internationally mobile students in the EU come from outside the EU.
- Students from Asia and Latin America choose the EU as a destination much more frequently than 10 years ago. This mirrors the growing importance of these countries in the global context.
- Some EU countries are primarily destinations in the context of intra-EU mobility (Austria, Belgium, Czech Republic, Estonia, Luxembourg, the Netherlands and Slovakia). Others are especially attractive for students from non-EU and non-OECD countries, as the composition of their international student body displays (Croatia, Finland, France, Italy, Lithuania and Sweden).
- Geographical proximity, historical ties and language similarities seem to contribute in a substantial way to students' country preferences.
- Some countries, in particular (?)their higher education institutions, attract male and female students in different ways, which is likely associated with the curriculum offered by study programmes.
- Aside from some Eastern European countries, the preferred field of study is social sciences, business and law. Most frequently chosen studies in these Eastern EU members belong to the field of health and welfare.

217. The main insights from the exploratory study part[45] concern the identification and discussion of internationally mobile students' staying behaviour:

- Typically, measures of staying or returning behaviour of internationally mobile students in the literature vary drastically for destination countries. This variation originates from a multitude of sources, such as countries of origin, reference year, time horizon, calculation procedure, underlying data source and type of student (e.g. Germany: 9 – 77.5%, the Netherlands: 29 – 94%, United Kingdom: 3 – 64%).
- More than a dozen alternative calculation methods were evaluated in the context of EU destination countries. Some of these examined methods generated for over 170 countries of origin specific stay rates.
- Within the exploratory study, a substantial degree of between-method variation could be observed on the EU member state level. This phenomenon is mainly driven by small sample sizes, data quality and partial violation of required assumptions. To mitigate stay rates' sensitivity to those issues, stay rates have been constructed in most cases as three year average over the years 2010 to 2012.
- For the EU as a whole, aggregate stay rates from stayers from all non-EU source countries lie within a range of 16.4 to 29.1%.
- Derived stay rates on the EU level are especially high for students from North-Western Africa and the Commonwealth of Independent States. Large enrolment numbers do not automatically imply high stay rates; for instance Chinese students, being by far the largest group, display only a stay rate between 13.7 and 15.5%.
- Current data sources only allow assessing short-term stay rates (6-12 months after the end of studies), this implies that the dynamic nature of subsequent staying decisions at a later career stage cannot be analysed.

218. Taking into account potential shortcomings of permit based stay rates these bilateral measures nevertheless offer the opportunity to investigate potential determinants of staying behaviour. The most essential results are the following ones:

- Internationally mobile students see their studies abroad as an integral part of their career path. Subsequent staying decisions are not taken lightly but made in light of perceived opportunities.
- Addressing the impact of perceived opportunities by observable differences between destination and source countries in socio-economic or socio-political dimensions provides valuable insights on an aggregate level.
- Similarity between host and source countries' language are associated with higher stay rates. A larger distance between these countries, reflecting higher monetary costs of migration and lower degrees of cultural proximity, is indicative of lower stay rates.
- Assuming that internationally mobile students base their staying or returning decision purely on economic differentials around their graduation might be too short-sighted.
- Higher general unemployment has not necessarily a deterring effect. Tertiary educated workers might still be able to find employment in a niche, according to their qualification.
- If an EU host country scores better regarding institutional quality and governance effectiveness, higher stay rates can be observed. This gives rise to the claim that stayers prefer a 'reliable' business or daily life environment.
- In a similar manner, higher scores regarding technological readiness and innovation serve as predictors for higher stay rates.
- Living circumstances in general have to be considered as relevant factors as well – more pronounced levels of political stability and absence of violence are associated with more likely staying decisions.

[45] Details can be found in the full version of this paper.

But if (political) participation opportunities are more developed in the home country, return becomes more likely.

- These possible determinants deliver a plausible explanation why stay rates amongst students from other OECD countries are typically very low and stay rates from students from less developed or politically less stable countries are much higher.

219. Examining the impact of post-graduation staying decision on European economies allowed drawing the following conclusions:

- Regarding labour market outcomes, those internationally mobile students who decide to stay are likely to be positively selected, especially if permission to stay is only granted in case of employment.
- International stayers have an employment rate which is at least as high as for their domestic peers. Unemployment is also not more frequent amongst stayers. The subsample of stayers from other EU countries is more often self-employed.
- Part-time employment is more widespread amongst international stayers, partially due to the fact that this group consists to a larger extent of married women. A positive selection of stayers explains also why they have a higher likelihood of having found permanent employment.
- Whilst there are no significant differences regarding income, international stayers face a much higher probability of working in a job requiring only medium or low skills. This is mainly driven by stayers from non-EU countries and points to problematic skill mismatches.
- Fields of study and preferred residential locations of international stayers lead to the conclusion that they have a low inclination towards selecting themselves into labour market segments with alleged shortages – they strictly prefer metropolitan areas and are not more likely to have graduated in the fields of "science, mathematics and computing", "engineering, manufacturing and construction" or "health and welfare".
- Current labour market conditions, i.e. increasing unemployment rates for tertiary educated labour below 30 years of age and declining real wages for young professionals in some larger EU economies, are neither favourable nor fostering the attractiveness of the EU labour market(s).
- International stayers can be expected to become net contributors to EU economies by no later than graduation. But already during their studies, their consumption of commodity and services adds to the host country's demand.
- Fiscal implications of providing funding for the education of internationally mobile students and related inefficiencies due to externalities could be taken into account, for instance by conditioning subsidies on subsequent staying behaviour.

220. Considering all above mentioned findings, two main policy recommendations can be distilled. The first one refers to structural data deficiencies which prevent a more in-depth analysis: to broaden analytical possibilities in this line of research, the harmonisation of existing data series should be promoted. Relevant dynamic aspects, regarding the retention of internationally mobile students after graduation in a medium- or long-run, can only be addressed if either the EU-LFS is slightly extended or a representative sample of international graduates participates in an online based survey. But, once again referring to the introductory Wilson quote, exactly such a medium- to long-term analysis enables to assess for how long the EU can 'borrow' the brains of internationally mobile academics.

221. The second recommendation encompasses a catalogue of measures to boost the EU's attractiveness, hence to increase stay rates. Proposed policy measures draw on a smooth labour market integration of international graduates by setting further incentives to remove language barriers already during studies or providing support regarding country-specific labour market peculiarities. Actively supporting post-graduate studies seems to be another promising way to increase retention of international talents in a medium-run. At the same time, the EU and all its members are well advised not only to maintain, but to cultivate their strong points: political stability and participation possibilities, reliable institutions and governance structure, as well as an innovative and competitive environment – all these

aspects exert a non-negligible influence on the decision to stay of highly-skilled, but also highly-mobile, individuals.

222. If we want to turn the potential, ensuing from a huge pool of internationally mobile students, into real and lasting gains for the EU, we should provide these individuals with long-term perspectives, not only long-term permits.

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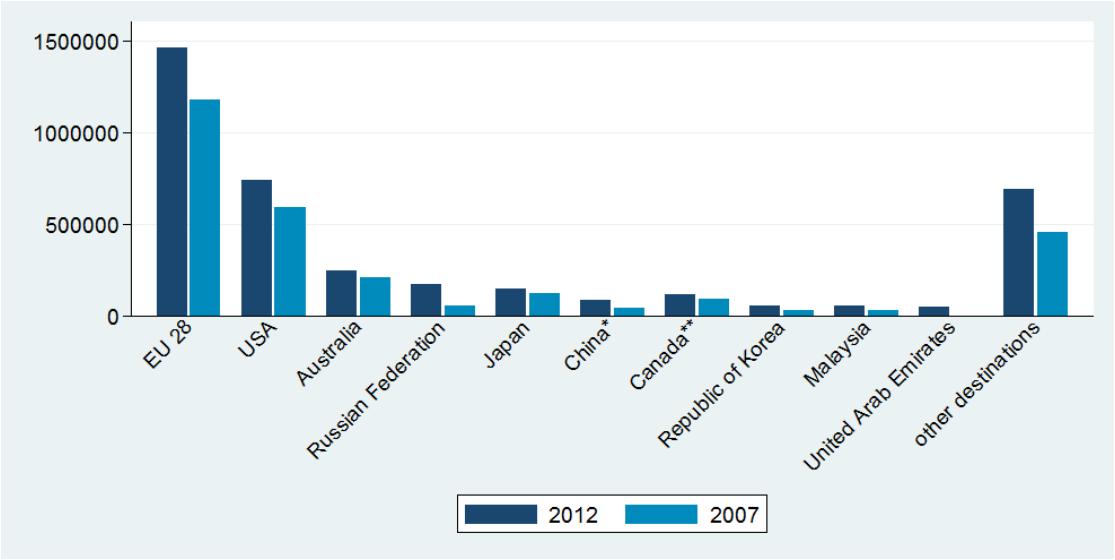
ANNEX

Figure A. 1 Stock of international students in the EU and other Top-10 destinations



Source: UNESCO Institute for Statistics, education database; own calculations and representation

Note: * includes People's Republic of China; Hong Kong, China and Macau, China

** most recent values from 2011 instead of 2012

Intra-EU mobility amounted in 2012 to approximately 514000, and in 2007 to 403000 students.

Table A. 1: Top five source countries in 2012 (excluding EU and EFTA countries)

	first	second	third	fourth	fifth
Austria	Turkey (2634)	Bosnia and Herzegovina (1965)	Serbia (1509)	Ukraine (865)	Russian Federation (754)
Belgium	China (1113)	Cameroon (1064)	India (553)	Iran (472)	Viet Nam (316)
Bulgaria	Turkey (5015)	FYROM (880)	Moldova (495)	Serbia (373)	Ukraine (370)
Cyprus	Bangladesh (1359)	Pakistan (717)	India (595)	China (362)	Nepal (344)
Czech Republic	Russian Federation (2912)	Ukraine (1727)	Kazakhstan (979)	Viet Nam (766)	Belarus (527)
Germany	China (18323)	Turkey (12222)	Russian Federation (10007)	Ukraine (5875)	Cameroon (5197)
Denmark	China (915)	Nepal (324)	USA (238)	India (198)	Russian Federation (102)
Spain	Colombia (5855)	Ecuador (3609)	Peru (3338)	Morocco (3209)	Mexico (2542)
Estonia	Russian Federation (163)	China (77)	Georgia (51)	Turkey (44)	Ukraine (34)
Finland	China (2129)	Russian Federation (2107)	Nepal (976)	Nigeria (939)	Viet Nam (904)
France	Morocco (28778)	China (26479)	Algeria (21804)	Tunisia (11134)	Senegal (8841)
Greece*	Albania (8622)	Ukraine (452)	Russian Federation (433)	Syria (336)	Jordan (243)
Croatia	Bosnia and Herzegovina (324)	Serbia (34)	Gibraltar (28)	Montenegro (22)	FYROM (18)
Hungary	Serbia (1427)	Ukraine (1019)	Iran (947)	Israel (739)	Nigeria (475)
Ireland	China (1471)	USA (1044)	Malaysia (801)	Canada (705)	India (352)
Italy	Albania (12045)	China (7645)	Iran (2975)	Cameroon (2652)	Peru (1963)
Lithuania	Belarus (1989)	Russian Federation (135)	Ukraine (110)	Israel (93)	Turkey (59)
Luxembourg**	Cameroon (73)	China (41)	Senegal (39)	USA (28)	Russian Federation (26)
Latvia	Russian Federation (357)	Ukraine (183)	Georgia (119)	Uzbekistan (96)	Belarus (91)
Malta	Kuwait (77)	USA (45)	Russian Federation (29)	China (16)	Libya (13)
Netherlands	China (4638)	Indonesia (910)	India (805)	Turkey (663)	Iran (657)
Poland	Ukraine (6118)	Belarus (2991)	USA (966)	Russian Federation (553)	China (549)
Portugal	Brazil (5172)	Angola (1679)	Cabo Verde (1475)	Turkey (334)	Mozambique (318)
Romania*	Republic of Moldova (5502)	Tunisia (1233)	Israel (939)	Morocco (408)	Serbia (375)
Slovakia	Serbia (300)	Ukraine (138)	Kuwait (101)	Saudi Arabia (79)	Israel (57)
Slovenia	FYROM (437)	Bosnia and Herzegovina (228)	Serbia (141)	Montenegro (46)	Russian Federation (37)

Sweden	China (3246)	Iran (2440)	Pakistan (1854)	India (1551)	Bangladesh (908)
United Kingdom	China (76913)	India (29713)	Nigeria (17542)	USA (14810)	Malaysia (12822)
EU 28*,**	China (146917)	India (42928)	Morocco (37706)	Turkey (30458)	Russian Federation (29953)

Source: UNESCO Institute for Statistics, education database

Note: * includes most recent values from 2011
** includes most recent values from 2010
+ no precise information with respect to students' country of origin available, only rough geographical region is known (Africa, Asia, Caribbean and Central America, Europe, North America, South America, and Oceania)

Table A. 2: Inbound ratios 2007 and 2012, by origin and destination

	EU		EFTA		OECD (net EU & EFTA)		Other countries		Total	
Country of study	2012	2007	2012	2007	2012	2007	2012	2007	2012	2007
Austria	11.5%	11.4%	0.2%	0.2%	1.0%	1.3%	2.8%	3.7%	15.4%	16.7%
Belgium	3.2%	3.3%	0.0%	0.0%	0.2%	0.1%	1.6%	0.6%	5.0%	4.0%
Bulgaria	0.2%	0.5%	0.0%	0.0%	1.9%	0.9%	1.8%	2.1%	3.9%	3.5%
Croatia	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.3%	2.3%	0.5%	2.4%
Cyprus	8.0%	3.0%	0.0%	0.0%	0.1%	0.1%	15.4%	22.0%	23.5%	25.1%
Czech Republic	6.4%	5.1%	0.1%	0.1%	0.1%	0.1%	2.3%	1.4%	8.9%	6.7%
Denmark	5.0%	2.6%	1.4%	1.3%	0.2%	0.6%	1.0%	0.9%	7.7%	5.4%
Estonia	1.6%	1.0%	0.0%	0.0%	0.2%	0.0%	0.7%	0.3%	2.5%	1.4%
Finland	1.4%	1.1%	0.0%	0.0%	0.3%	0.2%	4.0%	1.9%	5.7%	3.2%
France	2.1%	2.0%	0.1%	0.1%	0.7%	0.7%	8.2%	7.6%	11.2%	10.4%
Germany	1.8%	n	0.3%	n	0.9%	n	2.9%	n	6.5%	n
Greece*	2.3%	2.2%	0.0%	0.0%	0.1%	0.1%	1.9%	1.2%	4.3%	3.5%
Hungary	2.4%	2.0%	0.2%	0.2%	0.6%	0.3%	1.4%	1.0%	4.6%	3.5%
Ireland	2.3%	3.0%	0.0%	0.1%	1.0%	1.7%	2.1%	2.4%	5.5%	7.7%
Italy	1.0%	0.9%	0.0%	0.1%	0.2%	0.2%	2.7%	1.6%	4.0%	2.7%
Latvia	1.4%	0.5%	0.1%	0.0%	0.1%	0.0%	1.2%	0.6%	2.8%	1.1%
Lithuania	0.2%	0.4%	0.0%	0.0%	0.1%	0.1%	1.5%	0.4%	1.8%	1.0%
Luxembourg**	32.7%	n	0.1%	n	1.1%	n	7.1%	n	41.4%	n
Malta	2.3%	0.0%	0.0%	0.0%	0.5%	0.0%	2.1%	0.0%	4.8%	0.0%
Netherlands	5.0%	2.3%	0.1%	0.0%	0.3%	0.1%	1.5%	0.8%	7.0%	3.3%
Poland	0.3%	0.1%	0.1%	0.0%	0.1%	0.1%	0.7%	0.4%	1.2%	0.6%
Portugal	1.9%	0.7%	0.0%	0.0%	0.2%	0.1%	2.7%	4.1%	4.7%	4.9%
Romania*	0.4%	0.1%	0.0%	0.0%	0.2%	0.1%	1.2%	0.8%	1.8%	1.0%
Slovakia	3.4%	0.5%	0.2%	0.1%	0.1%	0.1%	0.5%	0.3%	4.1%	0.9%
Slovenia	1.1%	0.7%	0.0%	0.0%	0.0%	0.0%	1.0%	0.3%	2.2%	1.0%
Spain	0.9%	0.5%	0.0%	0.0%	0.3%	0.2%	1.7%	0.6%	2.8%	1.2%
Sweden	1.5%	2.0%	0.2%	0.1%	0.4%	0.4%	3.2%	0.2%	5.2%	2.7%
United Kingdom	5.3%	4.8%	0.3%	0.2%	1.5%	1.6%	9.9%	7.9%	17.1%	14.5%
EU 28*,***	2.4%	1.9%	0.1%	0.1%	0.5%	0.5%	3.8%	2.9%	6.9%	5.4%

Source: UNESCO Institute for Statistics, education database; own calculations

Note: * includes most recent values from 2011
** includes most recent values from 2010
*** without Germany and Luxembourg, since figures of international students for 2007 are not available
+ This table excludes data with no precise information with respect to students' country of origin available, only rough geographical region is known (Africa, Asia, Caribbean and Central America, Europe, North America, South America, and Oceania)
n number of international students or total enrolment figures for 2007 not available

Table A. 3: Inbound ratios by gender for 2002, 2007 and 2012

	2012		2007		2002	
	female	male	female	male	female	male
Austria	15.3%	15.5%	16.7%	16.6%	12.5%	13.0%
Belgium	8.9%	9.0%	7.1%	5.6%	10.3%	11.8%
Bulgaria	2.6%	5.5%	2.7%	4.4%	2.5%	4.6%
Croatia	0.5%	0.6%	2.4%	2.6%	0.5%	0.8%
Cyprus	14.3%	33.8%	11.7%	38.7%	14.9%	30.6%
Czech Republic	8.3%	9.9%	6.3%	7.2%	3.2%	3.7%
Denmark	7.3%	9.2%	5.6%	5.2%	n	n
Estonia	n	n	1.2%	1.7%	n	n
Finland	4.3%	7.3%	2.7%	3.9%	2.0%	2.9%
France	11.2%	12.5%	10.2%	12.7%	n	n
Germany	7.5%	6.6%	n	n	n	n
Greece*	5.0%	4.9%	n	n	n	n
Hungary	4.1%	5.3%	2.8%	4.5%	2.7%	4.0%
Ireland	n	n	9.5%	7.9%	4.9%	5.6%
Italy	4.1%	3.9%	2.9%	2.7%	1.5%	1.5%
Latvia	2.2%	3.7%	n	n	2.4%	3.8%
Lithuania	1.8%	1.8%	0.8%	1.2%	0.2%	0.8%
Luxembourg**	40.6%	42.2%	n	n	n	n
Malta	4.7%	5.0%	6.1%	6.3%	2.5%	7.9%
Netherlands	7.9%	6.6%	5.2%	4.1%	3.7%	3.6%
Poland	1.0%	1.5%	0.5%	0.7%	0.4%	0.4%
Portugal	4.8%	4.7%	4.3%	5.5%	n	n
Romania*	1.4%	2.4%	0.8%	1.2%	1.4%	2.3%
Slovakia	3.6%	4.8%	0.7%	1.1%	0.8%	1.3%
Slovenia	2.3%	2.3%	1.0%	1.1%	0.8%	1.1%

Spain	2.8%	2.8%	1.9%	1.7%	2.6%	2.3%
Sweden	4.6%	8.9%	4.2%	7.1%	5.8%	10.0%
United Kingdom	15.1%	19.8%	12.4%	18.2%	8.9%	11.7%

Source: UNESCO Institute for Statistics, education database; own calculations

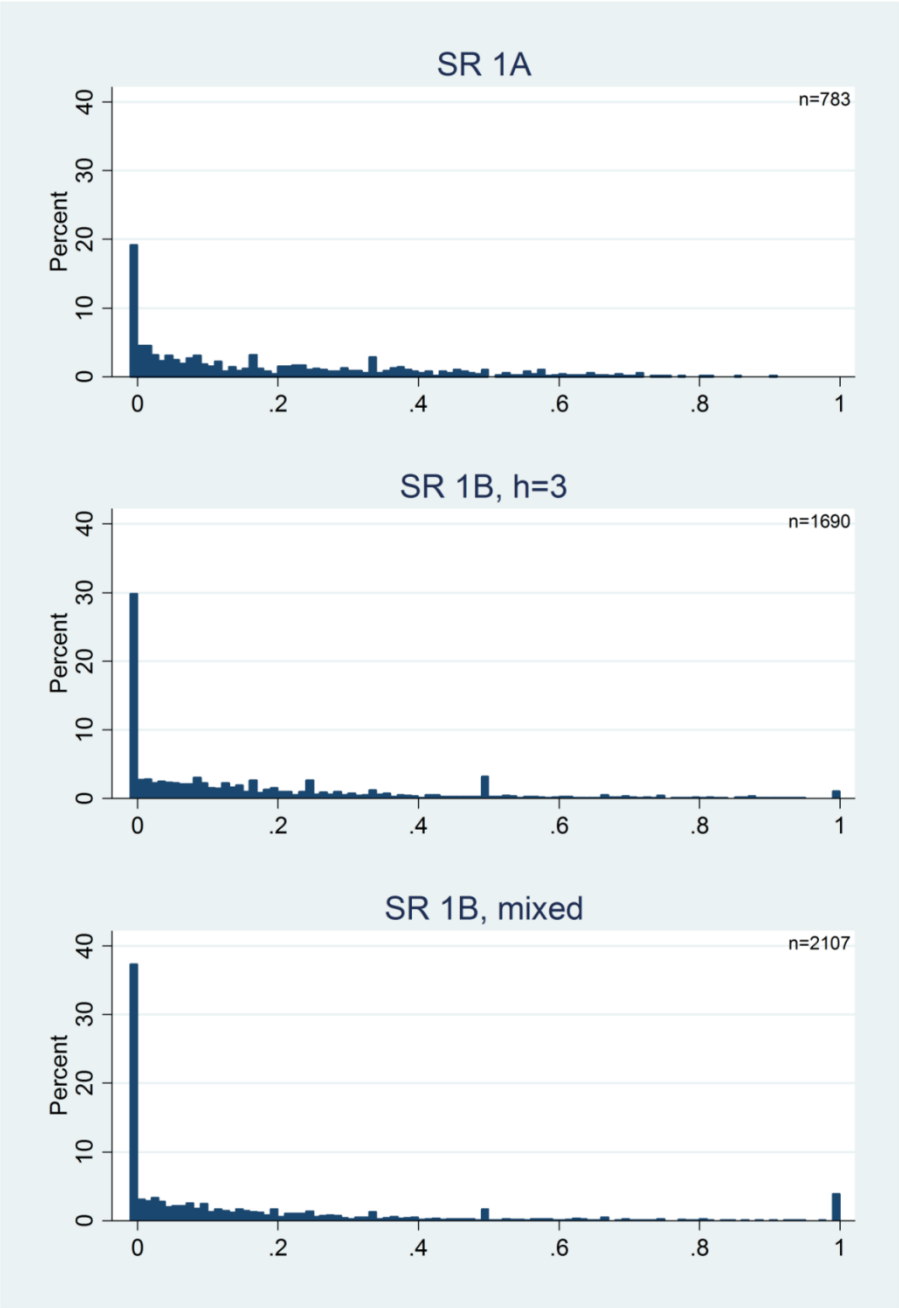
Note: * most recent values from 2011 instead of 2012

** most recent values from 2010 instead of 2012

n no data available

Gender difference of ratios amounts to 20 - 30 % of male ratio

Figure A.2 Distribution of conditional bilateral average stay rates



Note: The first bar gives values being exactly equal to zero, the subsequent ones cover a bandwidth of one percent each.

Table A. 4: Sequential one-part model comparison for the GCI specification

		SR 1A						SR 1B, h=3						SR 1B, mixed					
		(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Common official language		0.295**	0.336***	0.345***	0.330***	0.290**	0.640***	0.426***	0.449***	0.459***	0.447***	0.396***	0.681***	0.513***	0.561***	0.519***	0.515***	0.455***	1.000***
Colonial relationship (after 1945)		0.203	0.281*	0.466***	0.556***	0.570***	0.865***	0.323**	0.298**	0.351**	0.474***	0.515***	0.368**	-0.0471	-0.0507	0.13	0.296*	0.376**	-0.0256
Distance (between capitals)		-4.73e-05***	-4.63e-05***	-5.58e-05***	-5.84e-05***	-6.20e-05***	-6.38e-05***	-5.37e-05***	-5.52e-05***	-6.14e-05***	-6.66e-05***	-6.61e-05***	-6.29e-05***	-5.71e-05***	-5.86e-05***	-6.37e-05***	-6.70e-05***	-6.24e-05***	-6.55e-05***
DC controls		yes	yes	yes	yes	yes	no	yes	yes	yes	yes	yes	no	yes	yes	yes	yes	yes	no
GDP per capita	DC > OC	0.621	0.452	0.733	0.724			-0.398	-0.196	-0.000238	-0.0157			-0.0562	0.0313	0.269	0.262		
	OC > DC	-0.342	-0.538**	-0.977***	-0.982***			-1.032***	-1.005***	-1.363***	-1.387***			0.0912	-0.496	-1.250***	-1.256***		
Unemployment rate	DC > OC	-0.0831	0.0135	0.0098	0.0117			0.239	0.138	0.135	0.162			0.0716	0.0576	0.0596	0.0723		
	OC > DC	-0.223*	-0.181	-0.127	-0.139			-0.207*	-0.218**	-0.167	-0.169			-0.516***	-0.421***	-0.343***	-0.341***		
Diaspora effect*		13.62***	12.25**	8.399*				35.14***	31.72***	28.80***				31.77***	30.57***	25.66**			
Global Competitiveness Index (GCI)																			
P 1: Institutions	DC > OC	0.220*						0.465***						0.382***					
	OC > DC	-0.579**						-0.0498						-0.0714					
P 2: Infrastructure	DC > OC	0.0982						-0.0628						-0.174					
	OC > DC	0.127						-0.764***						-0.440**					
P 3: Macroeconomic environment	DC > OC	-0.0336						0.0688						-0.0812					
	OC > DC	0.051						-0.205						-0.226					
P 4: Health and primary education	DC > OC	-0.099						-0.0359						0.135					
	OC > DC	0.395						0.249						0.291					

P 5: Higher education and training	DC > OC	0.0248						0.0447						0.0534					
	OC > DC	-0.564*						0.0178						-0.546**					
P 6: Goods market efficiency	DC > OC	-0.159						-0.253**						-0.237*					
	OC > DC	-0.192						-0.21						0.18					
P 7: Labour market efficiency	DC > OC	-0.0748						0.186*						-0.0935					
	OC > DC	-0.158						-0.0604						-0.361**					
P 8: Financial market development	DC > OC	-0.0258						-0.0512						-0.00252					
	OC > DC	0.00409						-0.159						-0.148					
P 9: Technological readiness	DC > OC	0.422***						0.172						0.136					
	OC > DC	0.419						0.803**						-0.377					
P 10: Market size	DC > OC	0.156						0.147						0.255*					
	OC > DC	-0.440***						-0.204						-0.340**					
P 11: Business sophistication	DC > OC	0.0789						0.00923						0.0676					
	OC > DC	-0.137						-0.144						-0.235					
P 12: Innovation	DC > OC	-0.0216						0.106						0.25					
	OC > DC	-0.293						-0.306						-0.383*					
GCI	DC > OC		0.480***						0.369***						0.461***				
	OC > DC		-0.635***						-0.526**						-1.074***				
Constant		-2.297***	-2.378***	-2.235***	-2.210***	-2.240***	-1.507***	-2.707***	-2.558***	-2.447***	-2.391***	-2.448***	-1.524***	-2.791***	-2.773***	-2.610***	-2.573***	-2.683***	-1.533***
Observations		548	548	548	548	548	548	1,205	1,205	1,205	1,205	1,205	1,205	1,335	1,335	1,335	1,335	1,335	1,335
Residual df		497	519	521	522	526	544	1152	1174	1176	1177	1181	1201	1284	1306	1308	1309	1313	1331
Deviance		57.51	62.12	65.95	66.21	68.21	117.9	193	204.9	210.3	212.7	221.3	348.6	278.8	292.7	304.6	305.9	316.2	454.9

Log pseudolikelihood	-151.4	-153.7	-155.6	-155.8	-156.8	-181.6	-326.4	-332.3	-335	-336.2	-340.5	-404.2	-362	-369	-374.9	-375.6	-380.7	-450.1
AIC	0.739	0.667	0.667	0.663	0.652	0.677	0.63	0.603	0.604	0.605	0.605	0.677	0.619	0.596	0.602	0.602	0.603	0.68

*** p<0.01, ** p<0.05, * p<0.1

Note: Table reports coefficient estimates for a fractional binomial one-part model with complementary loglog link function and robust standard errors. Model specifications (1) display the coefficients from which average marginal effects from Table 6 have been derived.

Table A. 5: Sequential one-part model comparison for the WGI specification

		SR 1A					SR 1B, h=3					SR 1B, mixed				
		(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Common official language		0.370***	0.292**	0.275**	0.241**	0.644***	0.436***	0.384***	0.371***	0.332***	0.648***	0.566***	0.464***	0.459***	0.411***	1.023***
Colonial relationship (after 1945)		0.301**	0.444***	0.530***	0.545***	0.834***	0.224	0.274**	0.389***	0.417***	0.318**	0.004	0.175	0.282*	0.349**	-0.121
Distance (between capitals)		-4.29e-05***	-5.87e-05***	-6.14e-05***	-6.41e-05***	-6.52e-05***	-5.81e-05***	-6.90e-05***	-7.43e-05***	-7.17e-05***	-6.48e-05***	-5.43e-05***	-6.53e-05***	-6.75e-05***	-6.42e-05***	-6.48e-05***
DC controls		yes	yes	yes	yes	no	yes	yes	yes	yes	no	yes	yes	yes	yes	no
GDP per capita	DC > OC	0.600	0.735	0.726			-0.094	0.084	0.068			0.140	0.327	0.322		
	OC > DC	-0.297	-0.981***	-0.986***			-0.841	-1.363***	-1.384***			-0.189	-1.241***	-1.243***		
Unemployment rate	DC > OC	-0.090	-0.014	-0.011			0.093	0.146	0.176			-0.194	-0.100	-0.090		
	OC > DC	-0.192*	-0.162	-0.172			-0.232**	-0.219**	-0.220**			-0.403***	-0.380***	-0.379***		
Diaspora effect*		10.52**	8.515*				30.45***	30.42***				19.47*	18.26*			
Worldwide Governance Indicators (WGI)																
Control of Corruption	DC > OC	0.030					0.046					0.186				
	OC > DC	0.619					0.386					0.337				
Government effectiveness	DC > OC	0.266					0.398**					0.518**				
	OC > DC	-1.400*					0.404					-0.333				
Political stability and absence of violence / terrorism	DC > OC	-0.045					0.189**					0.246**				
	OC > DC	0.891**					-0.100					-0.288				

Rule of law	DC > OC	0.220					0.404*					0.234				
	OC > DC	0.260					-0.219					-0.731				
Regulatory quality	DC > OC	-0.009					-0.098					-0.002				
	OC > DC	-1.308					0.687					1.458***				
Voice and accountability	DC > OC	0.566**					0.027					-0.009				
	OC > DC	-1.219					-2.265***					-2.661***				
Constant		-3.222***	-2.172***	-2.148***	-2.192***	-1.493***	-3.240***	-2.290***	-2.236***	-2.318***	-1.485***	-3.563***	-2.423***	-2.399***	-2.514***	-1.500***
Observations		610	610	610	610	610	1,363	1,363	1,363	1,363	1,363	1,538	1,538	1,538	1,538	1,538
Residual df		572	583	584	588	606	1322	1334	1335	1339	1359	1499	1511	1512	1516	1534
Deviance		68.75	73.15	73.45	75.59	131.8	241.9	250.7	253.7	262.9	400.4	360.9	377.2	378	389.4	562
Log pseudolikelihood		-171.8	-174	-174.1	-175.2	-203.3	-385.2	-389.5	-391	-395.6	-464.4	-433.5	-441.6	-442	-447.7	-534
AIC		0.6880	0.6590	0.6560	0.6460	0.6800	0.6250	0.6140	0.6150	0.6160	0.6870	0.6140	0.6090	0.6090	0.6110	0.7000

*** p<0.01, ** p<0.05, * p<0.1

Note: Table reports coefficient estimates for a fractional binomial one-part model with complementary loglog link function and robust standard errors. Model specifications (1) display the coefficients from which average marginal effects from Table 7 have been derived.

Table A. 6: One-part vs. two-part GCI specifications, various link functions for SR 1A

		One-part fractional model					Two-part model, binary component					Two-part model, fractional component				
Link function		Logit	Probit	Loglog	Cloglog	Cauchit	Logit	Probit	Loglog	Cloglog	Cauchit	Logit	Probit	Loglog	Cloglog	Cauchit
Common official language		0.361**	0.206**	0.187**	0.295**	0.414*	0.763	0.534	0.552	0.755*		0.282*	0.163**	0.151**	0.230*	0.349
Colonial relationship (after 1945)		0.328	0.226*	0.292**	0.203	0.219	-1.596	-0.801	-1.291	-0.864		0.370*	0.240*	0.293**	0.243	0.276
Distance (between capitals)		-5.49e-05***	-3.05e-05***	-2.53e-05***	-4.73e-05***	-5.45e-05*	-0.000110**	-6.94e-05***	-8.21e-05**	-7.67e-05***		-3.98e-05**	-2.23e-05***	-1.89e-05***	-3.44e-05**	0.000
DC controls		yes	yes	yes	yes	yes	yes	yes	yes	yes		yes	yes	yes	yes	yes
GDP per capita	DC > OC	0.625	0.262	0.167	0.621	5.545	2.455	1.118**	2.232	0.539		0.570	0.224	0.119	0.588	5.535
	OC > DC	-0.353	-0.140	-0.067	-0.342	-1.035	-1.150	-0.680	-0.727	-0.747		-0.002	0.029	0.056	-0.035	-0.388
Unemployment rate	DC > OC	-0.096	-0.040	-0.020	-0.083	-0.140	-1.248	-0.625	-0.829	-0.482		0.003	0.009	0.014	0.001	-0.042
	OC > DC	-0.283*	-0.163**	-0.147**	-0.223*	-0.256	0.273	0.185	0.310	0.182		-0.344**	-0.204***	-0.192***	-0.271**	-0.317
Diaspora effect[+]		14.36**	7.649*	6.233	13.62***	32.64***	1236.000	583.000	1153.000	465.4*		11.67*	6.285	5.016	11.18**	23.19**
Global Competitiveness Index (GCI)																
P 1: Institutions	DC > OC	0.296**	0.181**	0.180**	0.220*	0.213	-0.384	-0.172	-0.411	-0.052		0.285**	0.174**	0.177**	0.211*	0.229
	OC > DC	-0.580**	-0.259**	-0.173**	-0.579**	-3.228*	-0.236	-0.182	-0.140	-0.226		-0.490**	-0.241**	-0.176**	-0.470**	-1.639*
P 2: Infrastructure	DC > OC	0.102	0.045	0.015	0.098	0.179	-0.030	-0.040	0.037	-0.050		0.102	0.050	0.025	0.098	0.162
	OC > DC	0.125	0.044	0.001	0.127	0.176	0.415	0.274	0.293	0.299		0.040	0.013	-0.012	0.044	-0.039
P 3: Macroeconomic environment	DC > OC	-0.046	-0.034	-0.043	-0.034	0.024	-0.617	-0.366	-0.601*	-0.275		0.067	0.036	0.028	0.045	0.082
	OC > DC	0.064	0.030	0.023	0.051	0.104	-0.535	-0.321	-0.323	-0.313		0.024	0.017	0.023	0.013	0.029

P 4: Health and primary education	DC > OC	-0.149	-0.088	-0.083	-0.099	-0.103	-0.151	-0.082	-0.102	-0.104	-0.120	-0.071	-0.072	-0.076	-0.093
	OC > DC	0.463*	0.266*	0.239**	0.395	0.495	-0.065	-0.010	-0.076	0.027	0.454*	0.266*	0.244**	0.380	0.356
P 5: Higher education and training	DC > OC	0.018	-0.002	-0.009	0.025	0.117	-0.081	-0.056	-0.014	-0.064	-0.022	-0.024	-0.033	-0.009	0.070
	OC > DC	-0.599*	-0.290*	-0.208*	-0.564*	-1.418	-0.041	0.009	-0.047	0.001	-0.574**	-0.294**	-0.224**	-0.534*	-1.255
P 6: Goods market efficiency	DC > OC	-0.184	-0.107	-0.086	-0.159	-0.150	0.871	0.485	0.737	0.422	-0.211	-0.124	-0.108	-0.176	-0.191
	OC > DC	-0.267	-0.163	-0.144	-0.192	0.132	-0.816	-0.480	-0.612	-0.538	-0.149	-0.092	-0.082	-0.110	0.179
P 7: Labour market efficiency	DC > OC	-0.085	-0.059	-0.059	-0.075	-0.007	-1.201**	-0.643**	-1.045***	-0.514**	0.008	0.000	-0.004	0.002	0.038
	OC > DC	-0.175	-0.094	-0.072	-0.158	-0.263	-0.307	-0.204	-0.144	-0.315	-0.153	-0.081	-0.061	-0.142	-0.222
P 8: Financial market development	DC > OC	0.005	0.024	0.050	-0.026	-0.160	-0.685	-0.438	-0.553	-0.490	0.115	0.090	0.123	0.051	-0.091
	OC > DC	0.016	-0.007	-0.014	0.004	0.114	-0.266	-0.100	-0.343	0.053	0.056	0.023	0.019	0.037	0.137
P 9: Technological readiness	DC > OC	0.534***	0.334***	0.331***	0.422***	0.400**	0.071	0.127	-0.040	0.216	0.461***	0.293***	0.311***	0.357***	0.362**
	OC > DC	0.439	0.226	0.169	0.419	1.241	0.328	0.130	0.173	0.151	0.303	0.161	0.121	0.303	0.765
P 10: Market size	DC > OC	0.187	0.097	0.077	0.156	0.239	-1.580***	-0.969***	-1.253***	-1.000***	0.315**	0.187**	0.181**	0.248**	0.268
	OC > DC	-0.486***	-0.247***	-0.179***	-0.440***	-0.722***	1.709**	0.955***	1.253***	0.957***	-0.548***	-0.297***	-0.237***	-0.484***	-0.712***
P 11: Business sophistication	DC > OC	0.080	0.023	-0.014	0.079	0.215	-0.712	-0.370	-0.568	-0.330	0.124	0.054	0.017	0.115	0.226
	OC > DC	-0.123	-0.033	0.003	-0.137	-0.906	-0.900	-0.502	-0.545	-0.490	0.004	0.026	0.043	-0.023	-0.434
P 12: Innovation	DC > OC	-0.014	0.008	0.029	-0.022	-0.087	0.072	0.024	-0.003	0.076	-0.010	0.006	0.026	-0.018	-0.067
	OC > DC	-0.307	-0.173	-0.156	-0.293	-0.790	0.867	0.528	0.612	0.562	-0.472*	-0.272**	-0.238**	-0.435*	-1.111
Constant		-3.727***	-2.059***	-1.476***	-3.640***	-11.27***	18.75***	5.730***	17.970	3.500***	-3.852***	-2.128***	-1.547***	-3.737***	-11.32***
Observations		548	548	548	548	548	548	548	548	548	458	458	458	458	458
Residual df		497	497	497	497	497	512	497	516	497	407	407	407	407	407
Deviance		57.74	58.08	58.78	57.51	57.71	300.7	301.2	300.4	301.3	42.32	42.39	42.65	42.26	42.71

Log pseudolikelihood	-151.5	-151.7	-152	-151.4	-151.5	-150.3	-150.6	-150.2	-150.7	-143.8	-143.8	-144	-143.8	-144
AIC	0.7390	0.7400	0.7410	0.7390	0.7390	0.6800	0.7360	0.6650	0.7360	0.8510	0.8510	0.8510	0.8510	0.8520
GGOFF	0.3120	0.1490	0.0109	0.2510	0.3520	0.7250	0.7810	0.6060	0.9430	0.8560	0.7030	0.1550	0.8140	0.3570
RESET (2)	0.1350	0.0512	0.0110	0.2670	0.0631	0.9980	0.9890	0.9960	0.9450	0.6690	0.4310	0.1590	0.9260	0.0720
RESET (3)	0.3170	0.1490	0.0388	0.5160	0.0571	1.0000	0.9990	1.0000	0.9160	0.7310	0.6680	0.3700	0.6650	0.0615

*** p<0.01, ** p<0.05, * p<0.1

Note: + 'Diaspora' is the share of migrants age 35+ from country of origin i in relation to the total population of destination country j.

Reported values for GGOFF and RESET are p-values. P-values of the GGOFF (Generalized Goodness of Functional Form) below a chosen threshold, e.g. 10%, indicate that the chosen link function should be rejected at this level. The RESET test is based on $E[SR|X,\beta,\gamma] = G[X\beta + \sum_{j=1}^{J} \gamma_j (X\beta)^{j+1}]$ with G[.] as the respective link function. RESET (2) tests for $\gamma_1 = 0$, RESET (3) for $\gamma_1 = \gamma_2 = 0$. Rejection of the Null points to misspecification.

Table A. 7: One-part vs. two-part GCI specifications, various link functions for SR 1B, h=3

		One-part fractional model					Two-part model, binary component					Two-part model, fractional component				
Link function		Logit	Probit	Loglog	Cloglog	Cauchit	Logit	Probit	Loglog	Cloglog	Cauchit	Logit	Probit	Loglog	Cloglog	Cauchit
Common official language		0.507***	0.290***	0.245***	0.425***	0.477*	0.927	0.461	0.748	0.397*	1.800	0.365***	0.213***	0.185***	0.306***	0.342*
Colonial relationship (after 1945)		0.385**	0.226**	0.207**	0.322**	0.466	0.861	0.591	0.680	0.606*	-1.767	0.357**	0.204**	0.187**	0.297**	0.471**
Distance (between capitals)		-5.95e-05***	-3.13e-05***	-2.36e-05***	-5.25e-05***	-8.42e-05***	-8.28e-05***	-4.52e-05***	-4.35e-05**	-5.14e-05***	0.000	-3.49e-05***	-1.85e-05***	-1.40e-05**	-3.11e-05***	-5.15e-05***
DC controls		yes	yes	yes	yes	yes	yes	yes	yes	yes		yes	yes	yes	yes	yes
GDP per capita	DC > OC	-0.381	-0.220	-0.185	-0.304	-0.347	0.854*	0.494**	0.536*	0.608**	1.089	-0.349	-0.213	-0.196	-0.269	-0.205
	OC > DC	-1.142***	-0.550***	-0.397***	-1.029***	-2.244**	-2.030***	-1.231***	-1.267***	-1.403***	-1.851	-0.292	-0.144	-0.111	-0.225	-0.280
Unemployment rate	DC > OC	0.268	0.151	0.124	0.240	0.333	-0.188	-0.095	-0.071	-0.090	-0.088	0.282	0.167*	0.152*	0.231	0.211
	OC > DC	-0.234*	-0.119*	-0.089	-0.210*	-0.456**	-0.365	-0.217	-0.272	-0.224	-0.245	-0.187	-0.103	-0.085	-0.166*	-0.303*
Diaspora effect[+]		50.04***	29.17***	33.54***	35.18***	83.75***	592.9**	342.3***	494.5**	348.9***	1527.000	37.38***	21.88***	23.20***	26.95***	55.30**
Global Competitiveness Index (GCI)																
P 1: Institutions	DC > OC	0.569***	0.335***	0.298***	0.471***	0.578***	0.920**	0.463**	0.778***	0.328*	1.919**	0.510***	0.293***	0.258***	0.423***	0.584***
	OC > DC	-0.024	-0.023	-0.017	-0.059	0.301	-0.917**	-0.560**	-0.719***	-0.586**	-1.089*	0.230	0.127	0.118	0.177	0.510
P 2: Infrastructure	DC > OC	-0.102	-0.067	-0.066	-0.070	-0.026	-0.385	-0.199	-0.300	-0.153	-0.623	-0.104	-0.068	-0.076	-0.063	-0.019
	OC > DC	-0.828***	-0.401***	-0.277***	-0.758***	-2.879*	-0.149	-0.050	-0.186	0.041	-0.674	-0.597**	-0.309**	-0.237**	-0.546**	-1.537*
P 3: Macroeconomic environment	DC > OC	0.093	0.051	0.039	0.078	0.100	0.114	0.074	0.031	0.097	0.030	0.166	0.093	0.081	0.125	0.193
	OC > DC	-0.201	-0.099	-0.070	-0.207	-0.539*	-0.242	-0.145	-0.090	-0.159	0.020	-0.197	-0.105	-0.083	-0.195	-0.375
P 4: Health and primary education	DC > OC	-0.042	-0.023	-0.017	-0.038	-0.057	-0.260	-0.150	-0.201	-0.134	-0.340	0.015	0.015	0.022	0.008	-0.022

	OC > DC	0.298	0.179	0.162	0.260	0.071	0.713	0.412	0.609*	0.305	0.734	0.170	0.117	0.123	0.114	-0.255
P 5: Higher education and training	DC > OC	0.041	0.019	0.010	0.041	0.083	-0.358	-0.197	-0.238	-0.161	-0.156	0.041	0.024	0.025	0.027	0.060
	OC > DC	-0.007	-0.007	-0.018	0.012	0.163	0.469	0.306	0.194	0.476	-0.037	-0.184	-0.118	-0.116	-0.142	-0.107
P 6: Goods market efficiency	DC > OC	-0.299**	-0.170**	-0.143**	-0.252**	-0.367**	-0.181	-0.099	-0.147	-0.069	-0.314	-0.175	-0.104	-0.102*	-0.125	-0.189
	OC > DC	-0.301	-0.178	-0.171	-0.211	0.170	0.254	0.126	0.194	0.103	0.617	-0.484	-0.280*	-0.257**	-0.371	-0.315
P 7: Labour market efficiency	DC > OC	0.213*	0.109*	0.081	0.182*	0.346**	-0.302	-0.163	-0.245	-0.125	-0.601	0.246**	0.133**	0.106**	0.207**	0.361***
	OC > DC	-0.076	-0.049	-0.044	-0.061	0.055	-0.210	-0.127	-0.132	-0.150	-0.112	0.047	0.015	0.002	0.058	0.283
P 8: Financial market development	DC > OC	-0.043	-0.020	-0.008	-0.052	-0.082	-0.605**	-0.345**	-0.407**	-0.355**	-0.762	0.038	0.028	0.039	0.016	-0.004
	OC > DC	-0.148	-0.064	-0.028	-0.155	-0.445	0.021	0.036	0.035	0.039	-0.126	-0.024	-0.013	-0.011	-0.012	-0.119
P 9: Technological readiness	DC > OC	0.216	0.128	0.113*	0.177	0.213	-0.047	-0.020	-0.118	-0.013	-0.656	0.264**	0.157**	0.141**	0.228**	0.263
	OC > DC	0.841**	0.413**	0.306**	0.797**	1.881**	-0.365	-0.234	-0.150	-0.370	0.019	0.672**	0.354**	0.271*	0.632**	1.059***
P 10: Market size	DC > OC	0.158	0.080	0.060	0.147	0.281	-1.306***	-0.798***	-0.900***	-0.838***	-1.060	0.344***	0.192***	0.160***	0.307***	0.459***
	OC > DC	-0.250	-0.127	-0.096	-0.213	-0.453	1.345***	0.778***	0.845***	0.854***	1.728*	-0.595***	-0.328***	-0.272***	-0.485***	-0.803***
P 11: Business sophistication	DC > OC	0.016	0.004	-0.004	0.015	0.041	0.219	0.136	0.160	0.123	0.130	-0.032	-0.024	-0.027	-0.034	-0.016
	OC > DC	-0.102	-0.032	-0.009	-0.148	-0.736	-0.891*	-0.509*	-0.514	-0.542**	-1.218	0.170	0.110	0.110	0.093	-0.140
P 12: Innovation	DC > OC	0.161	0.102	0.101	0.114	0.103	0.783**	0.436**	0.509*	0.440**	1.231	0.031	0.028	0.040	0.007	-0.096
	OC > DC	-0.292	-0.145	-0.105	-0.298	-1.519	1.408**	0.790**	0.836*	0.864***	2.019	-0.596**	-0.321**	-0.254**	-0.579**	-1.343
Constant		-4.086***	-2.159***	-1.471***	-4.057***	-19.57***	-1.473***	-0.862***	-0.580**	-1.385***	-1.928**	-3.320***	-1.843***	-1.266***	-3.280***	-7.402***
Observations		1,205	1,205	1,205	1,205	1,205	1,205	1,205	1,205	1,205	1,205	855	855	855	855	855
Residual df		1153	1153	1153	1153	1153	1153	1153	1153	1153	1153	803	803	803	803	803
Deviance		194	195.3	197.6	193.9	192.4	976.3	974.8	980.9	974.8	980.1	115.9	116.8	118.9	115.5	114
Log pseudolikelihood		-326.9	-327.5	-328.7	-326.8	-326.1	-488.1	-487.4	-490.5	-487.4	-490.1	-287.8	-288.3	-289.4	-287.6	-286.9

AIC	0.6290	0.6300	0.6320	0.6290	0.6280	0.8960	0.8950	0.9000	0.8950	0.9000	0.7950	0.7960	0.7980	0.7940	0.7930
GGOFF	0.0070	0.0012	0.0001	0.7060	0.0251	0.7380	0.7830	0.1020	0.8390	0.9240	0.0037	0.0004	0.0000	0.3490	0.1920
RESET (2)	0.0646	0.0050	0.0001	0.3830	0.1330	0.8050	0.8320	0.5570	0.8260	0.8430	0.0146	0.0011	0.0000	0.1960	0.5910
RESET (3)	0.0486	0.0028	0.0001	0.1700	0.0906	0.8230	0.9200	0.2500	0.7680	0.9610	0.0072	0.0006	0.0000	0.0685	0.8640

*** p<0.01, ** p<0.05, * p<0.1

Note: + 'Diaspora' is the share of migrants age 35+ from country of origin i in relation to the total population of destination country j.

Reported values for GGOFF and RESET are p-values. P-values of the GGOFF (Generalized Goodness of Functional Form) below a chosen threshold, e.g. 10%, indicate that the chosen link function should be rejected at this level. The RESET test is based on $E[SR|X,\beta,\gamma] = G[X\beta + \sum_{j=1}^{J} \gamma_j (X\beta)^{j+1}]$ with G[.] as the respective link function. RESET (2) tests for $\gamma_1 = 0$, RESET (3) for $\gamma_1 = \gamma_2 = 0$. Rejection of the Null points to misspecification.

Table A. 8: One-part vs. two-part GCI specifications, various link functions for SR 1B, mixed

		One-part fractional model					Two-part model, binary component					Two-part model, fractional component				
Link function		Logit	Probit	Loglog	Cloglog	Cauchit	Logit	Probit	Loglog	Cloglog	Cauchit	Logit	Probit	Loglog	Cloglog	Cauchit
Common official language		0.654***	0.372***	0.319***	0.513***	0.650*	0.691	0.338	0.431	0.373	1.667	0.362**	0.209**	0.203**	0.222	0.292
Colonial relationship (after 1945)		-0.090	-0.041	-0.019	-0.047	-0.009	1.412	0.870**	0.965	0.866**	-3.037	-0.065	-0.044	-0.051	0.025	0.092
Distance (between capitals)		-6.15e-05***	-3.23e-05***	-2.42e-05***	-5.71e-05***	-9.32e-05***	-0.000120***	-6.75e-05***	-8.35e-05***	-7.30e-05***	-0.000110***	0.000	0.000	0.000	0.000	0.000
DC controls																
GDP per capita	DC > OC	-0.108	-0.093	-0.103	-0.056	0.545	0.003	-0.003	-0.061	0.042	-0.041	-0.148	-0.103	-0.112	-0.078	0.218
	OC > DC	0.091	0.024	0.000	0.091	0.414	-0.708	-0.391	-0.343	-0.549*	-1.232*	0.269	0.124	0.076	0.225	0.528
Unemployment rate	DC > OC	0.051	0.033	0.024	0.072	0.009	-0.052	-0.031	-0.040	0.018	0.078	0.107	0.074	0.071	0.106	-0.006
	OC > DC	-0.575***	-0.305***	-0.232***	-0.516***	-0.805***	-0.176	-0.089	-0.125	-0.081	-0.054	-0.546***	-0.300***	-0.235***	-0.506***	-0.739***
Diaspora effect[+]		41.14***	24.04***	23.60***	31.77***	42.800	1,288**	610.0***	1,194**	522.0***	22,040***	31.02**	18.05**	17.71***	23.33**	38.620
Global Competitiveness Index (GCI)																
P 1: Institutions	DC > OC	0.456***	0.259***	0.217***	0.382***	0.551**	0.957***	0.551***	0.749***	0.522***	1.362***	0.301*	0.170*	0.140*	0.259**	0.370*
	OC > DC	-0.084	-0.060	-0.061	-0.071	0.163	-0.950***	-0.589***	-0.615***	-0.665***	-0.701	0.172	0.092	0.077	0.156	0.177
P 2: Infrastructure	DC > OC	-0.207	-0.112	-0.093	-0.174	-0.290	-0.268	-0.158	-0.212	-0.161	-0.125	-0.163	-0.099	-0.0992*	-0.112	-0.212
	OC > DC	-0.554**	-0.349***	-0.336***	-0.440**	-0.296	-0.665	-0.386	-0.730**	-0.252	-0.790	-0.454*	-0.292**	-0.297***	-0.363*	-0.289
P 3: Macroeconomic environment	DC > OC	-0.112	-0.067	-0.060	-0.081	-0.064	-0.254	-0.143	-0.214	-0.113	-0.516*	-0.017	-0.007	-0.002	-0.025	-0.062
	OC > DC	-0.269	-0.157*	-0.133**	-0.226	-0.246	-0.422	-0.270*	-0.198	-0.331**	-0.248	-0.294*	-0.167**	-0.144**	-0.235*	-0.284
P 4: Health and primary education	DC > OC	0.127	0.057	0.028	0.135	0.249	-0.490**	-0.300**	-0.330**	-0.341**	-0.495	0.326**	0.189**	0.161**	0.287**	0.335

	OC > DC	0.319	0.181	0.167	0.291	0.487	0.502	0.281	0.506	0.273	0.513	0.265	0.152	0.136	0.226	0.298
P 5: Higher education and training	DC > OC	0.083	0.058	0.069	0.053	0.029	-0.188	-0.132	-0.137	-0.123	0.125	0.139	0.083	0.093	0.086	0.141
	OC > DC	-0.626**	-0.305**	-0.217*	-0.546**	-1.229	0.269	0.191	0.251	0.201	-0.020	-0.573**	-0.293*	-0.225*	-0.489**	-0.976*
P 6: Goods market efficiency	DC > OC	-0.273*	-0.147*	-0.116*	-0.237*	-0.323	-0.293	-0.185	-0.280	-0.172	-0.348	-0.128	-0.066	-0.045	-0.113	-0.155
	OC > DC	0.186	0.096	0.066	0.180	0.294	0.795*	0.459*	0.446	0.467*	0.554	-0.070	-0.053	-0.064	-0.048	0.120
P 7: Labour market efficiency	DC > OC	-0.115	-0.067	-0.058	-0.094	-0.156	-0.111	-0.060	-0.063	-0.059	-0.290	-0.137	-0.081	-0.074	-0.112	-0.159
	OC > DC	-0.387**	-0.190**	-0.133**	-0.361**	-0.815	-0.557**	-0.337**	-0.391**	-0.350**	-0.453	-0.130	-0.068	-0.052	-0.110	-0.085
P 8: Financial market development	DC > OC	0.006	0.002	0.005	-0.003	-0.073	0.148	0.090	0.122	0.080	0.359	-0.105	-0.052	-0.035	-0.087	-0.179
	OC > DC	-0.170	-0.080	-0.044	-0.148	-0.224	0.380	0.272*	0.269	0.346**	0.302	-0.281	-0.155*	-0.128*	-0.213	-0.236
P 9: Technological readiness	DC > OC	0.164	0.088	0.070	0.136	0.283	0.061	0.054	0.031	0.054	-0.214	0.095	0.064	0.070	0.060	0.115
	OC > DC	-0.351	-0.092	0.024	-0.377	-1.634	-0.407	-0.259	0.040	-0.481	0.087	-0.195	-0.066	-0.005	-0.189	-0.669
P 10: Market size	DC > OC	0.271*	0.130*	0.084	0.255*	0.505**	-1.304***	-0.776***	-0.935***	-0.804***	-1.106***	0.528***	0.282***	0.216***	0.471***	0.837***
	OC > DC	-0.376**	-0.191**	-0.139**	-0.340**	-0.664**	1.874***	1.114***	1.305***	1.181***	1.485	-0.698***	-0.388***	-0.323***	-0.601***	-0.919***
P 11: Business sophistication	DC > OC	0.079	0.054	0.051	0.068	-0.039	-0.130	-0.053	-0.101	-0.023	-0.370	0.200	0.113	0.092	0.165	0.216
	OC > DC	-0.208	-0.059	-0.005	-0.235	-1.919	-0.475	-0.254	-0.012	-0.447	-0.307	-0.082	0.002	0.050	-0.135	-0.878
P 12: Innovation	DC > OC	0.317*	0.179*	0.148*	0.250	0.342	-0.016	0.004	-0.054	0.043	0.269	0.285*	0.165*	0.148**	0.210	0.284
	OC > DC	-0.405*	-0.232*	-0.218**	-0.383*	-1.307	-0.179	-0.167	-0.543	0.029	-0.243	-0.413*	-0.233**	-0.202**	-0.385*	-0.845
Constant		-3.837***	-2.036***	-1.363***	-3.807***	-14.71***	1.038**	0.586**	1.213***	0.188	-0.037	-3.489***	-1.926***	-1.331***	-3.403***	-8.490***
Observations		1,335	1,335	1,335	1,335	1,335	1,335	1,335	1,335	1,335	1,335	928	928	928	928	928
Residual df		1284	1284	1284	1284	1284	1284	1284	1284	1284	1284	877	877	877	877	877
Deviance		279.7	281.8	285.8	278.8	277.7	1152	1153	1156	1150	1116	171.2	172.8	176.7	169.9	168.9
Log pseudolikelihood		-362.5	-363.5	-365.5	-362	-361.5	-576.2	-576.4	-577.9	-575	-558.2	-308.2	-309	-311	-307.6	-307.1

AIC	0.6190	0.6210	0.6240	0.6190	0.6180	0.9400	0.9400	0.9420	0.9380	0.9130	0.7740	0.7760	0.7800	0.7730	0.7720
GGOFF	0.0150	0.0005	0.0000	0.0692	0.8200	0.7990	0.4970	0.8050	0.9140	0.0000	0.0007	0.0000	0.0000	0.0281	0.8410
RESET (2)	0.0064	0.0002	0.0000	0.0327	0.2150	0.9670	0.8020	0.9700	0.9010	0.8270	0.0017	0.0000	0.0000	0.0143	0.6670
RESET (3)	0.0196	0.0007	0.0000	0.0821	0.1470	0.9640	0.7290	0.9990	0.9520	0.0000	0.0007	0.0000	0.0000	0.0219	0.0499

*** p<0.01, ** p<0.05, * p<0.1

Note: [+] 'Diaspora' is the share of migrants age 35+ from country of origin i in relation to the total population of destination country j.

Reported values for GGOFF and RESET are p-values. P-values of the GGOFF (Generalized Goodness of Functional Form) below a chosen threshold, e.g. 10%, indicate that the chosen link function should be rejected at this level. The RESET test is based on $E[SR|X,\beta,\gamma] = G[X\beta + \sum_{j=1}^{J} \gamma_j (X\beta)^{j+1}]$ with G[.] as the respective link function. RESET (2) tests for $\gamma_1 = 0$, RESET (3) for $\gamma_1 = \gamma_2 = 0$. Rejection of the Null points to misspecification.

Table A. 9: One-part vs. two-part WGI specifications, various link functions for SR 1A

		One-part fractional model					Two-part model, binary component					Two-part model, fractional component				
Link function		Logit	Probit	Loglog	Cloglog	Cauchit	Logit	Probit	Loglog	Cloglog	Cauchit	Logit	Probit	Loglog	Cloglog	Cauchit
Common official language		0.429***	0.242***	0.206***	0.370***	0.510***	0.761	0.489	0.659	0.555*		0.365***	0.208***	0.180***	0.316***	0.453***
Colonial relationship (after 1945)		0.420**	0.277***	0.322***	0.301**	0.276*	-2.900	-1.020	-2.872	-0.969		0.472***	0.305***	0.346***	0.345**	0.307*
Distance (between capitals)		-5.15e-05***	-2.92e-05***	-2.45e-05***	-4.29e-05***	-5.02e-05**	0.000	-4.47e-05*	-5.88e-05*	-4.44e-05*		-4.35e-05***	-2.42e-05***	-2.02e-05***	-3.69e-05***	-5.07e-05**
DC controls		yes	yes	yes	yes	yes	yes	yes	yes	yes		yes	yes	yes	yes	yes
GDP per capita	DC > OC	0.610	0.253	0.152	0.600	5.222	0.863	0.055	1.028	-0.093		0.589	0.242	0.142	0.582	5.189
	OC > DC	-0.363	-0.219	-0.191	-0.297	-0.169	-1.334	-0.810*	-0.858	-0.902*		-0.017	-0.032	-0.045	0.022	0.788
Unemployment rate	DC > OC	-0.100	-0.051	-0.040	-0.090	-0.163	-0.310	-0.230	-0.235	-0.211		-0.074	-0.036	-0.026	-0.067	-0.131
	OC > DC	-0.252**	-0.153**	-0.145***	-0.192*	-0.127	-0.038	-0.012	-0.103	0.031		-0.291**	-0.174***	-0.162***	-0.227**	-0.194
Diaspora effect[+]		12.00*	6.904*	6.686	10.52**	20.14**	2,491**	1,173***	2,307**	949.8***		7.231	4.086	3.743	6.436	11.250
Worldwide Governance Indicators (WGI)																
Control of Corruption	DC > OC	0.018	-0.005	-0.015	0.030	0.240	-1.210**	-0.693**	-0.975**	-0.605**		0.174	0.092	0.073	0.162	0.293
	OC > DC	0.738	0.418	0.339*	0.619	-0.186	-0.118	-0.096	-0.228	-0.086		1.039*	0.561*	0.442**	0.899*	0.893
Government effectiveness	DC > OC	0.299	0.156	0.119	0.266	0.358	-0.133	-0.113	-0.238	-0.147		0.275	0.149	0.120	0.246	0.355
	OC > DC	-1.505*	-0.769**	-0.593**	-1.400*	-7.312	-0.612	-0.355	-0.569	-0.292		-1.284*	-0.660*	-0.515**	-1.197	-5.885
Political stability and absence of	DC > OC	-0.045	-0.020	-0.009	-0.045	-0.057	0.925***	0.571***	0.669***	0.574***		-0.106	-0.057	-0.046	-0.093	-0.115

violence / terrorism	OC > DC	1.083***	0.606***	0.492***	0.891**	0.256	3.075	1.248	2.677	1.151*	0.785**	0.460***	0.394***	0.616*	-0.607
Rule of law	DC > OC	0.257	0.139	0.110	0.220	0.407	1.212*	0.690*	1.083**	0.623*	0.213	0.103	0.073	0.189	0.568
	OC > DC	0.339	0.221	0.205	0.260	-0.332	1.474	0.952	1.049	1.104	-0.260	-0.085	-0.019	-0.283	-1.283
Regulatory quality	DC > OC	-0.011	-0.004	-0.004	-0.009	0.011	-0.335	-0.196	-0.152	-0.213	0.044	0.028	0.026	0.036	0.070
	OC > DC	-1.267	-0.269	-0.043	-1.308	-220.500	1.247	0.742	1.126	0.593	-2.568***	-0.777***	-0.347**	-2.608***	-272.0***
Voice and accountability	DC > OC	0.622**	0.322**	0.243*	0.566**	1.180*	-0.750	-0.421	-0.709	-0.342	0.639**	0.345**	0.274**	0.573**	1.075
	OC > DC	-1.105	-0.176	0.039	-1.220	-207.100	-1.482	-0.911	-1.067	-1.126	1.766***	0.663***	0.414***	1.698***	211.3***
Constant		-4.337***	-2.307***	-1.558***	-4.283***	-12.65***	18.370	5.811***	17.720	3.153***	-4.452***	-2.389***	-1.642***	-4.377***	-12.72***
Observations		610	610	610	610	610	610	610	610	610	502	502	502	502	502
Residual df		572	572	572	572	572	590	585	588	573	465	465	466	465	463
Deviance		68.81	69.04	69.66	68.75	69.21	370.1	371.5	367.1	373.3	50.21	50.4	50.92	50.12	50.38
Log pseudolikelihood		-171.8	-171.9	-172.2	-171.8	-172	-185	-185.7	-183.6	-186.6	-162.5	-162.6	-162.8	-162.4	-162.6
AIC		0.6880	0.6880	0.6890	0.6880	0.6880	0.6720	0.6910	0.6740	0.7330	0.7950	0.7950	0.7920	0.7950	0.8030
GGOFF		0.6660	0.2240	0.0045	0.8840	0.3610	0.1840	0.3380	0.0173	0.8970	0.4320	0.1340	0.0026	0.6030	0.6340
RESET (2)		0.3780	0.0848	0.0043	0.8190	0.2280	0.9840	0.9310	0.9850	0.9090	0.2550	0.0542	0.0024	0.6400	0.1490
RESET (3)		0.6760	0.2250	0.0154	0.9000	0.1260	0.9940	0.9380	0.9940	0.8720	0.4210	0.1360	0.0082	0.8370	0.1790

*** p<0.01, ** p<0.05, * p<0.1

Note: [+] 'Diaspora' is the share of migrants age 35+ from country of origin i in relation to the total population of destination country j.

Reported values for GGOFF and RESET are p-values. P-values of the GGOFF (Generalized Goodness of Functional Form) below a chosen threshold, e.g. 10%, indicate that the chosen link function should be rejected at this level. The RESET test is based on $E[SR|X,\beta,\gamma] = G[X\beta + \sum_{j=1}^{J} \gamma_j (X\beta)^{j+1}]$ with G[.] as the respective link function. RESET (2) tests for $\gamma_1 = 0$, RESET (3) for $\gamma_1 = \gamma_2 = 0$. Rejection of the Null points to misspecification.

Table A. 10: One-part vs. two-part WGI specifications, various link functions for SR 1B, h=3

		One-part fractional model					Two-part model, binary component					Two-part model, fractional component				
Link function		Logit	Probit	Loglog	Cloglog	Cauchit	Logit	Probit	Loglog	Cloglog	Cauchit	Logit	Probit	Loglog	Cloglog	Cauchit
Common official language		0.501***	0.289***	0.242***	0.433***	0.455**	0.149	0.096	0.025	0.116	-0.042	0.450***	0.261***	0.229***	0.388***	0.489**
Colonial relationship (after 1945)		0.263*	0.152*	0.140*	0.223	0.334	1.349**	0.842**	0.986	0.914***	0.341	0.205	0.120	0.111	0.172	0.230
Distance (between capitals)		-6.35e-05***	-3.39e-05***	-2.53e-05***	-5.66e-05***	-7.73e-05***	-5.66e-05**	-3.29e-05**	-3.16e-05*	-3.82e-05***	0.000	-4.46e-05***	-2.42e-05***	-1.87e-05***	-3.96e-05***	-5.88e-05***
DC controls		yes	yes	yes	yes	yes		yes	yes	yes	yes	yes	yes	yes	yes	yes
GDP per capita	DC > OC	0.104	0.055	0.037	0.100	0.257	0.717**	0.414**	0.390*	0.512**	1.148	0.104	0.031	-0.002	0.118	0.470
	OC > DC	-0.950*	-0.520***	-0.424***	-0.839	-2.438	-1.390**	-0.839***	-0.960***	-0.881***	-1.203	-0.431	-0.266	-0.256*	-0.344	-0.093
Unemployment rate	DC > OC	0.116	0.065	0.061	0.091	0.148	0.011	-0.008	0.012	-0.024	0.252	0.095	0.057	0.054	0.076	0.094
	OC > DC	-0.270**	-0.146**	-0.116**	-0.233**	-0.409***	-0.292	-0.182	-0.226	-0.186	-0.332	-0.240**	-0.135**	-0.113**	-0.207**	-0.307**
Diaspora effect[+]		50.56***	29.03***	35.13***	30.59***	99.710	1,010***	495.4***	874.8***	439.8***	2,867*	28.33**	16.90***	18.32**	19.28***	37.460
Worldwide Governance Indicators (WGI)																
Control of Corruption	DC > OC	0.049	0.028	0.025	0.051	0.096	-0.131	-0.057	-0.115	-0.022	-0.257	0.016	0.018	0.028	0.013	-0.021
	OC > DC	0.467	0.275	0.222	0.367	-1.479	-0.630	-0.383	-0.586	-0.317	-0.588	0.741	0.437*	0.373*	0.613	-0.051
Government effectiveness	DC > OC	0.429**	0.219**	0.167**	0.391**	0.811**	-0.318	-0.215	-0.191	-0.272	-0.094	0.479**	0.262**	0.215**	0.426**	0.687**
	OC > DC	0.349	0.098	0.024	0.417	3.700*	0.101	0.077	0.111	0.077	0.028	0.113	0.015	-0.011	0.165	1.560
Political stability and absence of violence / terrorism	DC > OC	0.224**	0.128**	0.112**	0.190**	0.287**	0.690***	0.391***	0.514***	0.344***	0.595**	0.120	0.069	0.061	0.101	0.140
	OC > DC	-0.078	-0.028	-0.014	-0.105	-2.057	-1.609*	-0.919**	-1.260**	-0.846*	-2.091	0.597	0.321	0.269*	0.531	1.118

Rule of law	DC > OC	0.449*	0.219	0.145	0.399	0.856	-0.063	-0.051	-0.091	-0.031	-0.014	0.512**	0.255*	0.176	0.454*	0.771
	OC > DC	-0.127	0.035	0.090	-0.225	-3.315	2.203***	1.284***	1.471***	1.309**	2.280	-0.854*	-0.405	-0.285	-0.869*	-3.938*
Regulatory quality	DC > OC	-0.107	-0.055	-0.040	-0.097	-0.149	-0.310	-0.156	-0.267	-0.093	-0.336	0.015	0.017	0.023	0.006	-0.040
	OC > DC	0.747	0.322	0.220	0.683	4.520*	-0.712	-0.378	-0.390	-0.383	-0.992	1.062*	0.507	0.334	1.040*	3.781*
Voice and accountability	DC > OC	0.039	0.034	0.038	0.026	0.016	0.142	0.094	0.110	0.123	0.174	0.003	0.008	0.016	-0.002	0.000
	OC > DC	-2.302***	-0.938**	-0.580**	-2.264***	-45.730	-1.714	-0.959*	-0.824	-1.287*	-2.493	-1.366**	-0.585*	-0.329	-1.385***	-8.500
Constant		-4.715***	-2.472***	-1.686***	-4.636***	-19.14***	-0.898*	-0.536**	-0.137	-1.137***	-1.440	-3.840***	-2.115***	-1.469***	-3.762***	-7.780***
Observations		1,363	1,363	1,363	1,363	1,363	1,363	1,363	1,363	1,363	1,363	957	957	957	957	957
Residual df		1323	1323	1323	1323	1323	1323	1323	1323	1323	1323	917	917	917	917	917
Deviance		243.3	244.2	245.8	243.6	243.5	1211	1211	1212	1211	1208	151.4	152	153.4	151.1	150.7
Log pseudolikelihood		-385.8	-386.3	-387.1	-386	-385.9	-605.4	-605.5	-606.1	-605.6	-604.1	-339.9	-340.2	-340.9	-339.7	-339.5
AIC		0.6250	0.6260	0.6270	0.6250	0.6250	0.9470	0.9470	0.9480	0.9470	0.9450	0.7940	0.7950	0.7960	0.7940	0.7930
GGOFF		0.0192	0.0007	0.0022	0.7620	0.0356	0.9400	0.9800	0.6140	0.8730	0.8270	0.0674	0.0092	0.0003	0.4130	0.3840
RESET (2)		0.6490	0.1410	0.0049	0.8670	0.0239	0.9970	0.9700	0.9810	0.8760	0.8860	0.0824	0.0154	0.0003	0.2730	0.2480
RESET (3)		0.0236	0.0008	0.0000	0.1000	0.0724	0.9990	0.9880	0.9960	0.9400	0.9890	0.0663	0.0093	0.0002	0.1870	0.5110

*** p<0.01, ** p<0.05, * p<0.1

Note: [+] 'Diaspora' is the share of migrants age 35+ from country of origin i in relation to the total population of destination country j.

Reported values for GGOFF and RESET are p-values. P-values of the GGOFF (Generalized Goodness of Functional Form) below a chosen threshold, e.g. 10%, indicate that the chosen link function should be rejected at this level. The RESET test is based on $E[SR|X,\beta,\gamma] = G[X\beta + \sum_{j=1}^{J} \gamma_j (X\beta)^{j+1}]$ with G[.] as the respective link function. RESET (2) tests for $\gamma_1 = 0$, RESET (3) for $\gamma_1 = \gamma_2 = 0$. Rejection of the Null points to misspecification.

Table A. 11: One-part vs. two-part WGI specifications, various link functions for SR 1B, mixed

		One-part fractional model					Two-part model, binary component					Two-part model, fractional component				
Link function		Logit	Probit	Loglog	Cloglog	Cauchit	Logit	Probit	Loglog	Cloglog	Cauchit	Logit	Probit	Loglog	Cloglog	Cauchit
Common official language		0.667***	0.381***	0.327***	0.566***	0.729***	0.324	0.129	0.203	0.190	1.360	0.481***	0.281***	0.255***	0.399***	0.529***
Colonial relationship (after 1945)		0.001	0.007	0.019	0.004	0.025	0.684	0.554	0.334	0.620*	-3.409*	0.041	0.020	0.016	0.055	0.137
Distance (between capitals)		-6.13e-05***	-3.30e-05***	-2.49e-05***	-5.43e-05***	-7.16e-05***	-9.24e-05***	-5.53e-05***	-6.57e-05***	-5.99e-05***	-0.000108***	-2.73e-05*	-1.43e-05*	0.000	-2.58e-05*	-3.76e-05*
DC controls		yes	yes	yes	yes	yes		yes	yes	yes	yes	yes	yes	yes	yes	yes
GDP per capita	DC > OC	0.130	0.026	-0.012	0.140	1.208	-0.518	-0.301	-0.460*	-0.234	-0.035	0.179	0.064	0.024	0.185	0.846
	OC > DC	-0.269	-0.193	-0.188	-0.189	1.061	-0.735	-0.465	-0.319	-0.671**	-0.271	0.019	-0.038	-0.087	0.073	0.746
Unemployment rate	DC > OC	-0.237	-0.132	-0.112	-0.194	-0.275	-0.213	-0.140	-0.194	-0.113	-0.113	-0.165	-0.096	-0.092	-0.130	-0.199
	OC > DC	-0.446***	-0.229***	-0.162**	-0.403***	-0.650***	-0.156	-0.094	-0.116	-0.097	-0.043	-0.378***	-0.203***	-0.151**	-0.338***	-0.495***
Diaspora effect[+]		26.45*	16.33*	17.71*	19.47*	21.090	2,425**	1,018***	2,248***	878.1***	31,914***	10.850	6.626	6.705	7.994	7.785
Worldwide Governance Indicators (WGI)																
Control of Corruption	DC > OC	0.199	0.104	0.082	0.186	0.429	0.113	0.081	0.147	0.058	0.231	0.028	0.020	0.020	0.041	0.133
	OC > DC	0.410	0.215	0.146	0.337	-0.224	-1.469***	-0.914***	-1.105***	-0.977**	-1.533**	1.037	0.557*	0.429	0.918	1.235
Government effectiveness	DC > OC	0.554**	0.272**	0.191**	0.518**	1.467**	-0.140	-0.111	-0.125	-0.118	0.054	0.604***	0.321***	0.249***	0.538***	1.015**
	OC > DC	-0.385	-0.185	-0.112	-0.333	-1.104	-0.214	-0.108	0.068	-0.232	-0.212	-0.488	-0.230	-0.128	-0.451	-0.825
Political stability and absence of violence / terrorism	DC > OC	0.268**	0.151**	0.123***	0.246**	0.388**	0.737***	0.451***	0.533***	0.441***	0.485***	0.146	0.084	0.066	0.139	0.174
	OC > DC	-0.246	-0.043	0.017	-0.288	-4.345	-1.439**	-0.835**	-1.426***	-0.670	-0.860	0.713	0.440*	0.390**	0.580	0.122

Rule of law	DC > OC	0.272	0.142	0.101	0.234	-0.011	0.188	0.119	0.104	0.191	0.070	0.297	0.145	0.093	0.255	0.272
	OC > DC	-0.690	-0.218	-0.076	-0.731	-6.605**	2.829***	1.759***	1.901***	2.138***	1.880	-1.756***	-0.832***	-0.583**	-1.704***	-8.484***
Regulatory quality	DC > OC	-0.016	-0.015	-0.015	-0.002	0.252	-0.425	-0.229	-0.320*	-0.215	-0.396	0.139	0.083	0.079	0.122	0.253
	OC > DC	1.574***	0.744***	0.528***	1.458***	6.897***	0.449	0.363	0.148	0.448	1.136	1.492***	0.697**	0.465**	1.424***	7.429***
Voice and accountability	DC > OC	0.011	0.011	0.012	-0.009	0.003	-0.534*	-0.294	-0.490**	-0.195	-0.651*	0.200	0.112	0.100	0.155	0.250
	OC > DC	-2.760***	-1.214***	-0.818***	-2.661***	-60.50*	-3.178**	-1.831***	-1.987***	-2.418***	-86.60***	-1.801**	-0.791**	-0.499*	-1.735**	-12.68***
Constant		-4.702***	-2.438***	-1.625***	-4.656***	-17.81***	0.947*	0.545*	1.161***	0.042	-0.046	-4.422***	-2.400***	-1.674***	-4.303***	-10.10***
Observations		1,538	1,538	1,538	1,538	1,538	1,538	1,538	1,538	1,538	1,538	1,045	1,045	1,045	1,045	1,045
Residual df		1499	1499	1499	1499	1499	1499	1499	1499	1499	1499	1006	1006	1006	1006	1006
Deviance		362.3	364.1	367.7	360.9	358.3	1437	1446	1427	1454	1329	236.7	238.1	241	235.4	232.7
Log pseudolikelihood		-434.2	-435.1	-436.9	-433.5	-432.1	-718.6	-722.9	-713.5	-727.2	-664.4	-371.4	-372.1	-373.5	-370.7	-369.4
AIC		0.6150	0.6160	0.6190	0.6140	0.6130	0.9850	0.9910	0.9790	0.9960	0.9150	0.7850	0.7870	0.7890	0.7840	0.7820
GGOFF		0.0052	0.0002	0.0000	0.0046	0.1900	0.0000	0.0009	0.0001	0.4590	0.0000	0.0000	0.0000	0.0000	0.0000	0.0369
RESET (2)		0.0008	0.0000	0.0000	0.0035	0.3160	0.4480	0.6330	0.4880	0.5350	0.9200	0.0000	0.0000	0.0000	0.0000	0.0412
RESET (3)		0.0037	0.0001	0.0000	0.0137	0.0553	0.2540	0.3530	0.3090	0.6660	0.1220	0.0000	0.0000	0.0000	0.0001	0.0099

*** p<0.01, ** p<0.05, * p<0.1

Note: [+] 'Diaspora' is the share of migrants age 35+ from country of origin i in relation to the total population of destination country j.

Reported values for GGOFF and RESET are p-values. P-values of the GGOFF (Generalized Goodness of Functional Form) below a chosen threshold, e.g. 10%, indicate that the chosen link function should be rejected at this level. The RESET test is based on $E[SR|X,\beta,\gamma] = G[X\beta + \sum_{j=1}^{J} \gamma_j (X\beta)^{j+1}]$ with G[.] as the respective link function. RESET (2) tests for $\gamma_1 = 0$, RESET (3) for $\gamma_1 = \gamma_2 = 0$. Rejection of the Null points to misspecification.